THE

FOREST TREES

OF

MYSORE AND COORG.

THIRD EDITION.

EDITED BY

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AND

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PREFACE TO THE FIRST EDITION.

This list of some of the trees of Mysore and Coorg is published, with the sanction of the Chief Commissioner, for the use of Forest Officers and District Officers. It is interleaved to admit of additions or corrections. With the exception of a few well known trees, the vernacular names of trees in Mysore and Coorg vary in almost every single district, and this gives rise to both inconvenience and confusion. Before a list of Mysore and Coorg trees can be considered to be complete in its nomenclature, a large collection of verified synonyms is wanted. The present list will, it is hoped, be the small beginning of a valuable compilation. It can be extended without altering its shape. Natural Orders, as may be necessary, can be inserted in their proper places.

2. The probationers lately appointed to the Department, have all received a very good grounding in Botany; and the Forest Divisional Officers under whom they are placed have been requested to furnish them with the means of forming good herbariums, and to see that they do so. When they have succeeded in collecting and in properly identifying a number of the yet unknown trees of Mysore, and when much additional knowledge has been collected and recorded by District and Forest Officers regarding the economic uses of trees and

shrubs, and on other interesting points connected with such trees and shrubs, this list might be carefully revised and greatly enlarged. If this be enjoined on the Forest Officers as a part of their duty, and if the District Officers would interest themselves in the matter, material enough might be collected within the next three years for compiling a very useful handbook of Mysore Trees; and this might eventually grow into a valuable work.

3. In an appendix will be found a list of the commoner cereals, oils, pulses, condiments, &c., grown in Mysore. It is taken from the Gazetteer.

4. Indexes of technical, vernacular, and English names are given.

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Conservator of Forests,
Mysore and Coorg.

PREFACE TO THE THIRD EDITION.

THE *Third Edition* of "The Forest Trees of Mysore and Coorg" has been published at the request of Mr. Lancelot Ricketts, the Inspector-General of Forests and Plantations in Mysore, on whose action, also, a valuable file of purely local and provincial information had been accumulated for the purpose, by the officials of the Forest Department.

With this substantial help, and with the fullest reference to such recently published works as, The Flora of British India, *Hooker*; Dictionary of the Economic Products of India, *Watt*; Flora Sylvatica for Southern India, *Beddome*; The Forest Flora of North-West and Central India, *Brandis*; Pharmacographia Indica, *Dymock, Warden*, and *Hooper*; and Mr. Graham Anderson's "Forest Trees in the Coffee Lands of South Mysore," the Editor has been able to greatly enlarge the work, extend its scope generally, and, it may be hoped, carry it nearer to the ultimate condition foreseen by Captain (now Colonel) G. J. van Someren, in his preface to the first edition.

But although our knowledge of arboriculture has improved, a reference to the text will reveal that there is still much to be learned concerning the identity, nomenclature, utility, and treatment of local trees; and until these sources of information have been fully explored and exhausted, we cannot hope to possess a complete handbook on the Forest

Flora of Mysore and Coorg. It is also desirable, for the present at least, to keep the book within the limits of a pocket companion, which, although not providing full information, will undoubtedly lead to further enquiry being made in one or other of the standard works named throughout the text.

It is necessary to explain that the work has not been strictly limited to a description of "Forest Trees" as the title would indicate. Introduced exotic trees have been admitted, as also fruit trees and a few conspicuous plants that are usually associated with forest conservancy.

The appendices contain lists which, it is believed, will be of use for occasional reference.

J. CAMERON.

Full titles of the scientific and other works quoted, or recommended for reference, in "The Forest Trees of Mysore and Coorg."

Fl. of Brit. Ind.	Flora of British India. *Hooker.*
Dict. of Econ. Prod. of Ind.	Dictionary of the Economic Products of India. *Watt.*
Brand. For. Fl.	Forest Flora of the North-West and Central India. *Brandis.*
Bedd. Fl. Sylv.	Flora Sylvatica for Southern India. *Beddome.*
Bedd. Icon. Pl. Ind. Or.	Icones Plantarum Indiæ Orientalis. *Beddome.*
Bot. Mag.	Botanical Magazine. *Hooker.*
Pharm. Ind.	Pharmacographia Indica. *Dymock, Warden, & Hooper.*
Useful Pl. of Ind.	The Useful Plants of India. *Drury.*
Gamb. Man. Timb.	Manual of Indian Timbers. *Gamble.*
Wight Ill.	Illustrations of Indian Botany, *Wight.*
Wight Ic.	Icones Plantarum Indiæ Orientalis. *Wight.*
Bedd. For. Rep.	Administration Reports of the Madras Forest Department. *Beddome.*
Off. Guide R. G. Kew.	Guide to the Royal Botanic Gardens, Kew. *Oliver.*
Kurz For. Fl. Burm.	Forest Flora of British Burma. *Kurz.*
Or. & Lem. of Ind. & Cey.	The Cultivated Oranges and Lemons of India and Ceylon. *Bonavia.*

Dalz. & Gibs. Bomb. Fl.	Bombay Flora. *Dalzell & Gibson.*
Hook. Bot. Miscell.	Botanical Miscellany. *Hooker.*
Bentl. & Trim. Med. Pl.	Medicinal Plants. *Bentley & Trimen.*
Benth. Fl. Austr.	Flora Australiensis. *Bentham.*
Thw. Enum.	Enumeratio Plantarum Zeylaniæ. *Thwaites.*
Roxb. Cor. Pl.	Plants of the Coromandel Coast. *Roxburgh.*
King Fic.	The Species of Ficus of the Indo-Himalayan and Chinese countries. *King.*
Ander. For. Trees.	Forest Trees in the Coffee Lands of Mysore. *Anderson.*
Econ. Pl. Jamaica.	Index to Economic Plants in Jamaica. *Fawcett.*
Bot. Plates Lal-Bagh Collection.	A collection of several hundred coloured botanical plates, the property of the Mysore Botanical Gardens at Bangalore.

I. DILLENIACEÆ.

1 Dillenia indica, LINN. *Kan.* Kanagala, Bet, betta, and bettada Kanagal, or Ganagalu.

Fig.—*Bot. Plates Lal-Bagh Collection; Wight Ic. 823; Bedd. F. S. 103.*

References.—*Fl. of Brit. Ind.; Brandis p. 3.*

An ornamental tree of the Malnad. Leaves alternate, crowded towards the apex, petiolate, broadly lanceolate, serrate; nerves parallel and strongly marked underneath; average blade 9×3 in. Flowers large, solitary; sepals fleshy or thickly coriaceous; petals pure white, fragrant. Fruit globose, the size of a large apple, closely invested by the accrescent sepals.

This round-headed tree affords dense shade and is well adapted for scenic planting. But in the maidan tracts, the species is slow of growth and rarely attains its full size and beauty. Wood light brown with a smooth grain, said to be used for gunstocks. The leaves are used to serve food upon, in lieu of plates.

Cultivation.—Propagate from seed, or plant the whole fruit in beds of half decomposed humus. When the seedlings are a year old, plant them in large pits at about 30 feet apart. This treatment applies generally to all the species of *Dillenia.*

2 Dillenia bracteata, WIGHT.

The same vernacular names are possibly applied to this species.

A large evergreen tree, differing from the above in possessing smaller parts and racemed flowers. Perhaps less abundant in the Malnad. Economic properties unknown.

3 Dillenia pentagyna, ROXB. *Kan.* Koltega, Kaltega, Kad kanagala, *Coorg*, Male geru.

Fig.—*Bedd. Fl. Sylv. 104.*

References.—*Brandis p. 3.; Fl. of Brit. Ind.; Dict. of Econ. Prod. of Ind.*

A fine spreading tree of the subtropical hill region. Bare of leaf for a brief period in February, or later according to season. Leaves oblong-lanceolate, serrate, decurrent; petiole winged, average blade 15×5 in. Flowers in umbels of 6—8, corolla yellow. Fruit pendulous, the size of a gooseberry, said to possess a pleasant acid flavour, and is probably eaten by the local hill tribes. Although nicely marked, the wood is heavy, somewhat coarse-grained and difficult to season. Weight 50 lb. per cubic foot. But further trial appears necessary to fully test the qualities of this wood. The leaves afford good and ample material for making humus, and in the villages about Poona they are used to thatch houses. When tender, they are in requisition to serve food upon.

II. MAGNOLIACEÆ.

4 Michelia Champaca, LINN. *Kan.* Sampige, Sampaghy, Sampage.

Fig.—*Bot. Plates Lal-Bagh Collection; Wight Ill. i. 13.*

References.—*Dict. of Econ. Prod. of Ind.; Brandis p. 3.*

This handsome evergreen tree attains a great size, and is an object of much admiration in the open glades of the Malnad country. Rare specimens attain to 80 or even 100 feet, having a circumference of 20 feet at the base of the trunk. Leaves alternate, petiolate, pale green, ovate-lanceolate, acuminate, entire, average blade 10×4 in. Flowers axillary, large, pale-yellow and strongly scented.

Fruit sessile and capsular, containing 4—6 seeds. The Sampige is frequent in Coorg, and in the western parts of Mysore as far as Nagar. Cultivated in the maidan districts, especially about Hindu shrines, for its popular flowers. On gala days the latter are entwined in the hair and worn about the person. As a source of perfume they should command attention. Timber good, heartwood glossy, dark brown, close-grained and somewhat brittle. Weight 40 lb. per cubic foot. Much prized for making furniture, carriages, and fine articles of cabinet-work, as the seasoned wood takes a fine polish. Much good timber is wasted in the erection of village buildings.

Cultivation.—The Sampige is easily raised from seed. When a foot or more in height the seedlings should be planted at 40 feet apart in deep alluvial soil. A garden variety of the species, having cream-coloured flowers, is held in high esteem, and is often grafted on to the typical stock, when the latter is about three feet in height. In the strictly maidan region the tree is usually stunted in growth, but it attains full development in the uplands of Hassan and Shimoga.

5 Michelia nilagirica, ZENK.

An evergreen tree of the Western Ghâts.

6 Magnolia grandiflora, LINN.

A small evergreen tree, or stout woody climber when placed near suitable support. Introduced from Carolina and cultivated for its superb flowers. Confined at present to the Botanical Gardens.

III. ANONACEÆ.

7 Polyalthia longifolia, BENTH. *Kan.* Putrajivi?

Fig.—*Bot. Plates Lal-Bagh Collection*; *Bedd. t. 38.*

References.—*Bedd. Fl. Sylv., Brandis p. 4.*

A lofty evergreen tree. Cultivated in gardens

occasionally, but not usually found in the Mysore country. It should not be confounded with the indigenous tree *Putranjiva Roxburghii*, which is known in the Malnad by the same vernacular name. The species under notice is said to be indigenous to Tanjore and the drier parts of Ceylon, where the English denizens have called it the "mast tree." It grows slowly at Bangalore, and produces a large quantity of fruit resembling coffee berries, in February and March. Leaves alternate, shortly petiolate, lanceolate, tapering uniformly into a fine acumen, margin undulated, glabrous and shining; average blade $7 \times 1\frac{3}{4}$ in. Flowers creamy-green. Beddome asserts that the seasoned wood weighs 37 lb. per cubic foot, and that it is used for drum cylinders.

Cultivation.—Easily raised from seed, and grows best in a deep sandy soil under the influence of sea breezes. On inland plains growth is unsatisfactory. Plant at 20 feet apart.

8 Polyalthia coffeoides, Benth.

Fig.—*Bedd. Ic. Pl. Ind. Or. t. 53.*

References.—*Brandis p. 5., Fl. of Brit. Ind.*

An ornamental tree of Western Mysore. Beddome writes that "the young leaves come out a most brilliant red colour," also that the fresh bark, which is made into ropes by the Kurambars, smells strongly of ammonia. Specimens of this species should be submitted from the western boundary.

9 Polyalthia fragrans, Benth.

Fig.—*Bedd. Icon. Pl. Ind. Or. t. 54.*

Reference.—*Fl. of Brit. Ind.*

A large evergreen tree having fragrant flowers; confined to the moist forests of the Western Ghâts. Uses undetermined.

10 **Polyalthia cerasoides,** Benth. *Kan.* San hesare, Vubbina ?

References.—*Fl. of Brit. Ind.*; *Dict. of Econ. Prod. of Ind.*

This elegant tree is mostly confined to the dry forest tracts skirting the foot of the Ghâts and projecting eastward into the plains. It is readily detected among other trees by its greenish flowers, which are very fragrant and appear in great profusion towards the end of March. Timber close-grained, durable, and used extensively in the Bombay Presidency. District forest officers have not included the species in their lists, unless it is under some vernacular name which has not, as yet, been referred to *P. cerasoides.* In all such cases good botanical specimens should be submitted for identification. There are probably one or two additional species of *Polyalthia* represented in the western forests of the State, but their names are withheld for the present. Taken as a group the *Polyalthias* are perhaps more ornamental than strictly useful trees. Their culture has also to be confined to the evergreen forest ranges or, in a few instances, to the seaside. They all produce fertile seeds.

11 **Anona squamosa,** Linn. *Kan.* Duranji, *Hind.* Sitaphal.

Fig.—*Bot. Plates Lal-Bagh Collection*; *Bot. Mag. 3095.*

References.—*Pharm. Ind.*; *Econ. Pl. Jamaica*; *Fl. of Brit. Ind.*

The custard apple tree of this country, and the sweet-sop of the West Indies, from whence it was originally introduced to the east. Extensively cultivated in gardens and running wild in hedgerows and woods, where it forms a nurse to sandal and other valuable trees. Leaves alternate, petiolate, oblong-obtuse, or rarely acute, glaucous underneath,

average blade $3\frac{1}{2} \times 1\frac{1}{2}$ in. Flowers solitary or in pairs, greenish-yellow. Fruit the size of an apple, tubercled, many seeded.

Timber soft and close-grained. Weight 46 lb. per cubic foot. Custard apples are reputed to be good for the digestion. "Leaves, immature fruits and seeds, contain a principle fatal to insects. The leaves are often rubbed on floors, &c., in houses to get rid of insects." *Fawcett.*

In this country, the seed-powder is applied to the head for a similar purpose. Local importance is attached to the medicinal properties of the seed, leaf, and bark of this well-known species.

Cultivation.—Existing measures are, as a rule, very hap-hazard, but with proper irrigation and the selection of good manures the different custard apples might be cultivated with much profit. Experiment in grafting would no doubt produce good results, as it has done in the case of mango, guava, and other tropical fruits. Seedlings are easily raised.

12 Anona reticulata, Linn. *Kan.* Ramphal, Ramphala.

Fig.—*Bot. Plates Lal-Bagh Collection.*

References.—*Econ. Pl. Jamaica; Dict. Econ. Prod. of Ind.*

A small tree. The "bullocks heart," or proper custard apple of the West Indies. Leaves alternate, shortly petiolate, slightly pubescent when young, subsequently glabrous, oblong-acute, average blade $5 \times 2\frac{1}{2}$ in. Flowers axillary, in twos or threes, greenish-yellow. Fruit larger and not so prolific as in the sweet-sop. Wood indifferent in quality and small in growth. Weight about 40 lb. per cubic foot. Cultivated in gardens, but not so popular as the foregoing species although the fruit is admitted to be good.

The young leaves and fruit afford substances for dyeing and tanning.

13 Anona muricata, LINN. *Kan.* Mullu Ramphala.

Fig.—*Bot. Plates Lal-Bagh Collection.*

Reference.—*Drury Useſl. Pl. Ind.*

The soursop. A small evergreen tree cultivated in Botanical Gardens, and rarely elsewhere in this country. This species is easily determined from its congeners by the fruit. The latter is larger than other custard apples, (occasionally weighing 2 lbs.) somewhat unshapely and covered with long soft prickles. Its properties are diuretic. Root said to be an antidote against fish-poison. Wood unknown. Specimens may be seen in the Lal-Bagh.

14 Saccopetalum tomentosum, H. F. & T. *Kan.* Hessare, Hessari.

Fig.—*Bedd. Ic. Pl. Ind. Or. t. 49.*

"A tall handsome tree of the Western Ghâts. Bark $\frac{1}{3}$ of an inch thick, of various shades, sometimes black and deeply cracked. Wood moderately hard, olive brown, smooth, close-grained and having no heartwood. Weight 45 lb. per cubic foot. Only used for fuel." *K. Shama Iyengar.* This fine tree, of which little is really known, should be utilised for scenic and avenue planting at Hassan, Shimoga and other municipal towns on the confines of the Malnad.

15 Alphonsea madraspatana, Bedd.

Fig.—*Bedd. Ic. Pl. Ind. Or. t. 92.*

Reference.—*Fl. of Brit. Ind.*

A large umbrageous tree with leathery shining leaves and bright yellow flowers. Usually found on the banks of rivers at an elevation of 2000 to 3000 feet. Except that it is highly ornamental,

the local uses of this tree are undescribed. More local information is needed, with good herbarium specimens.

16 Bocagea Dalzellii, H. F. and T.

Fig.—*Bedd. Ic. Pl. Ind. Or. t. 42.*

References.—*Fl. of Brit. Ind.*; *Pharm. Ind.*

This is a moderate-sized tree of the Malnad; perhaps not very abundant. It affords good timber of a reddish colour said to be used in house-building. The leaves, which are not unlike those of the Portugal laurel, are applied as a fomentation in rheumatism. The crowded white flowers, succeeded by smooth fruit the size and form of a large marble, each containing two seeds, are prominent characters of this species.

IV. CAPPARIDEÆ.

17 Cratæva religiosa, Forst. *Kan.* Nervala, *Coorg,* Nerujani, Vitusi ?

References.—*Dict. of Econ. Prod. of Ind.*; *Pharm. Ind.*; *Fl. of Brit. Ind.*

A small tree frequenting the banks of streams and rivers, unarmed and glabrous. Leaves deciduous, 3—foliolate, long petioled, average leaflet $4\frac{1}{2} \times 1$ in.

Flowers 3 in. diam., in corymbs at the ends of the branches; yellow changing to purple. Fruit globose or ovoid according to variety, the size of a small bael-fruit.

Wood soft and even-grained. Said to be used for drums, combs, and in turnery. Leaves and bark medicinal. This small tree, which is very showy while in flower, is often planted in native burial grounds. It does not succeed in very dry situations.

18 Cadaba indica, Lamk. *Kan.* Maragade.

This shrub is found in the Kankanhalli jungle, and at intervals throughout the maidan tracts. The leaves are reputed to have anthelmintic properties, and a decoction of them is a common village remedy for children and others who are possessed of worms. To sores and festers they are applied in the form of a poultice. *C. trifoliata,* W. and A. is also indigenous to the maidan. It is a rigid shrub with green flowers and berried fruit.

V. BIXINEÆ.

19 Cochlospermum Gossypium, D.C. *Kan.* Arisina buruga.

Fig.—*Bot. Plates Lal-Bagh Collection.*

References.—*Dict. of Econ. Prod. of Ind.; Fl. of Brit. Ind.; Pharm. Ind.*

A small deciduous tree of dry hills and forests. It is the golden-yellow-flowered silk cotton tree, and should not be confounded with *Eriodendron anfractuosum,* the white-flowered silk cotton nor *Bombax malabarica,* the red-flowered species. Remaining bare through the early part of the dry season, the tree bursts into flower in March and is then a conspicuous object all over the districts where it is plentiful. Leaves large, palmate, softly tomentose underneath, glabrous on the surface, average blade 7 × 5 in. Capsules softly tomentose, larger than a goose's egg. The latter, when ripe, yield a quantity of fine floss (silk cotton so-called) which is in demand in continental hospitals for stuffing pillows. Its local use for the same purpose is perhaps limited, as it is said to impart great heat. A gum, which is occasionally used in the Upper Provinces in lieu of Tragacanth, is exuded from the trunk. The wood weighs about 17 lb. per cubic

foot, and is practically of no value. Specimens of the tree will be seen near the entrance gate to the Botanical Gardens. The fine golden-yellow flowers appear in February and March in advance of the young leaves.

Cultivation.—Raise from seed, and plant when a foot high in any loamy soil.

20 Bixa Orellana, LINN. *Kan.* Rangamali, Rangumale, sanna japali.

Fig.—*Bot. Plates Lal-Bagh Collection.*

References.—*Useful Pl. of Ind.*; *Dict. of Econ. Prod. of Ind.*

This handsome shrub is naturalised in Mysore, as in other parts of India. It rarely attains to the size of a small tree. Known in the Malnad by the name of "sanna japali." The red pulpy covering of the seed (the testa) is used as a dye under the name of Arnatto.

" It is prepared by macerating the capsules in boiling water, extracting the seeds, and leaving the pulp to subside: the fluid being subsequently thrown off. The residium, with which oil is sometimes mixed, is placed in shallow vessels and dried in the shade. When properly made it should be of a bright yellow colour." *Drury.* Arnatto has gone out of use practically; but formerly it was a popular dye for silk and Dutch cheese.

The shrub is easily propagated from seed.

21 Scolopia crenata, CLOS. *Kan.* Dodda japalu, Japala, Japle or Adicay japle.

References.—*Fl. of Brit. Ind.*; *Ander. For. Trees.*

A good-sized tree of the Malnad. Wood white, hard, dense, liable to twist in plank. When felling this timber the edges of tools are quickly blunted. It is reputed to be a good fuel timber; and the tree

affords fairly good shade to coffee. The acid fruit, which is the size and form of a potato-plum, is eaten by the hill tribes. Seeds germinate readily. Specimens are wanted for herbarium.

22 **Flacourtia sepiaria,** Roxb. *Kan.* Miridi.

Fig.—*Bot. Plates Lal-Bagh Collection.*

References.—*Fl. of Brit. Ind.*; *Dict. of Econ. Prod. of Ind.*

A rigid, spinescent bush, well known for its sub-acid fruit, the size of a pea. The subsessile, obovate, leaves are relished by cattle, but are protected to some extent by the formidable spines of the species. The tree called "Abblu" in the Shimoga list is probably *Flacourtia inermis,* Roxb. but this requires further investigation. Anderson calls the same tree "Ubblu." "Shade fair and no actual bad effect known (for coffee). Fruit edible. Wood used for making ploughs, rough beams, posts and charcoal; also as fuel."

23 **Gynocardia odorata,** R. Br. *Hind.* Chaulmugra.

Fig.—*Bot. Plates Lal-Bagh Collection.*

References.—*Fl. of Brit. Ind.*; *Gamble, Man. Timb.*; *Dict. of Econ. Prod. of Ind.*

A glabrous evergreen tree of Northern India and China. Cultivated in the Lal-Bagh. Leaves alternate, shortly petiolate, oblong-elliptic, apex acute and slightly twisted; average blade 8×3 in. Flowers axillary or upon the old wood in small clusters, yellow and sweet scented. Fruit subglobose, the size of a large citron, attached, like the flowers, to the old wood. Chaulmugra seed affords a valuable medicinal oil which is prized for leprosy and like skin diseases. Delivered at Calcutta the seeds are worth Rs. 12 per Bengal maund of 80 lbs. Wood close-grained and durable. Weight 47 lb.

per cubic foot. The Bangalore climate is a little too dry for the best growth of this useful species, but efforts should be made to establish it in the Malnad, where it would thrive well and eventually add to forest revenue. It thrives best in a deep virgin soil near the banks of streams.

24 **Hydnocarpus Wightiana**, Blume. *Tel.* Niradi-vittulu.

Fig.—*Wight. Ill. i. t. 16.*

References.—*Fl. of Brit. Ind.; Dict. of Econ. Prod. of Ind.; Pharm. Ind.*

This fine tree is occasionally met with on the extreme western boundary. Leaves alternate, shortly petiolate; elliptic to oblong-lanceolate, apex acuminate; average blade 8 × 3 in. Flowers solitary or racemed, corolla white, one inch in diam. Fruit globose, the size of an apple, woolly or rough. The medicinal oil expressed from the seed is locally applied to ulcers and skin eruptions, but it is scarcely a marketable article. The quality of the timber is unknown, except that it attains a large size. Specimens are wanted for the herbarium.

25 **Hydnocarpus alpina**, Wight. *Kan.* Sanna solti, Torathi.

Fig.—*Wight. Ic. t. 942.*

References.—*Dict. of Econ. Prod. of Ind.; Bedd. Fl. Sylv.*

This handsome tree attains to a maximum height of 100 feet. It is a grand object for avenues and scenic planting, but would not succeed well on the plains. Beddome remarks that the wood "answers as deal for general purposes, packing cases and firewood." Herbarium specimens, with matured seed, should be collected and forwarded to head-quarters by the Malnad forest officers.

26 Asteriastigma macrocarpa, Bedd. *Kan.* Dodda solti.

Fig.—*Bedd. Fl. Sylv. Pl. 266.*

Described as a very handsome tree with large red fruit. Not authenticated. Specimens are wanted for the herbarium.

VI. TAMARISCINEÆ.

27 Tamarix gallica, Linn.

This interesting bush (rarely a small tree) is found on the banks and in the silted beds of rivers. In general appearance it reminds one of a very stunted *Casuarina.* It is a plant of great antiquity, frequently mentioned by Pliny and other early writers. Galls and manna are medicinal products of the species. It thrives near the sea and in inland situations where there are saline deposits.

VII. GUTTIFERÆ.

28 Garcinia Cambogia, Desrouss. *Kan.* Manthulli, Aradalada—Manjarabad.

Fig.—*Bedd. Fl. Sylv. t.* 85.

References.—*Fl. of Brit. Ind.*; *Dict. of Econ. Prod. of Ind.*

An evergreen tree of the Western Malnad; habit erect, branches or leaves drooping. The opposite, exstipulate, coriaceous, dark-green leaves are characteristic of the genus. Average blade, in this species, $4\frac{1}{2} \times 1\frac{3}{4}$ in. Flowers conspicuous and unisexual. Fruit the size of a small apple, when ripe yellow or reddish, grooved from the base to the middle. The rind is eaten when ripe and preserved at an earlier stage as a condiment. The liber (inner bark) exudes a yellow juice, or semi-transparent gamboge, which is unsuitable for painting.

Beddome considers the wood of value and recommends it for articles of furniture. Weight 54 lb. per cubic foot.

29 **Garcinia Morella,** Desrouss. *Kan.* Kankutake, Kankootgal.

Fig.—*Bedd. Fl. Sylv. t.* 86; *Wight Ic. t.* 102.

References.—*Fl. of Brit. Ind.*; *Dict. of Econ. Prod. of Ind.*

This is the true gamboge tree. Evergreen, confined to the Malnad and never of very large size. In foliage and flower it rather closely resembles the foregoing species, from which it is best determined by its subglobose fruit, the size of a cherry and slightly 4-angled. The yellow pigment which exudes from the wounded trunk is the proper gamboge of commerce. Although the tree is somewhat abundant on the Ghâts, it is not largely utilised for its gum-resin. Lovery remarks that it is "useful for building and firewood." This is surely misplaced utility! Each fruit contains 3—4 seeds which germinate freely. It is useless attempting to grow the species profitably outside the Malnad.

30 **Garcinia Xanthochymus,** Hook. *Kan.* Divarige, Devagarige.

Fig.—*Bot. Plates Lal-Bagh Collection.*

References.—*Dict. of Econ. Prod. of Ind.*; *Fl. of Brit. Ind.*

When laden with its golden-yellow fruit, the size of an English apple, this evergreen tree is strikingly effective and beautiful. In young trees the dark-green, coriaceous, leaves are occasionally 20 × 3 in. An inferior gamboge is afforded by the liber, and the rind of the green fruit; and in some parts of India this product is converted into a useful dye. The fruit possesses medicinal properties and

is perhaps eaten occasionally by the jungle people, although it is said to spoil the teeth. Wood used for building, but not fully reported on. Two fine specimens of this species, which have assumed a pyramidal form, will be seen in Mr. Virasami Mudaliyar's garden behind the Bangalore Fort.

In addition to the above, the Malnad forests should possess *Garcinia indica*, Chois. and *Garcinia Wightii*, T. Ander.

Cultivation.—Raise from seed and grow in virgin forest soil at an elevation of 3000 to 5000 feet. Shade is necessary in the early stages of cultivation.

31 Ochrocarpus longifolius, BENTH. *Kan.* Surgi.

Fig.—*Bot. Plates Lal-Bagh Collection. Wight Ic. t.* 1999. *Bedd. Fl. Sylv. t.* 89.

References.—*Fl. of Brit. Ind.*; *Dict. of Econ. Prod. of Ind.*

A dense evergreen tree of the Western Gháts. Leaves opposite, shortly petiolate, glabrous, coriaceous, oblong, shortly acute. Average blade 8×3 in. Flowers in axillary clusters on the upper trunk and limbs, polygamous, rose-coloured and sweetly fragrant. When in blossom, during the hot season, the trees are infested by thousands of bees searching for honey. Berry the size of a gooseberry. Lovery says the tree is plentiful in the Malnad where it is also cultivated for its delicious flowers.

Although occasionally used for local building the properties of the wood are little known. At present the commercial value of the species is chiefly confined to its flower buds and open flowers which are used in temples, for personal adornment and to yield a dye for silken fabrics. The flower buds have also medicinal properties. When dried they are valued at Rs. 2—12—0 to Rs. 3 per maund of 28 lbs. and

are known to dyers as "Red Nagkesar." Good specimens of the tree may be seen in the Botanical Gardens, where they blossom in April and produce fruit three months later.

Cultivation.—Sow seeds among leaf litter under the shade of mango or other umbrageous trees.

When the seedlings are a few inches high, transplant into tiles or flower pots, and treat in the latter until the following season, when the young trees will be large enough for final planting at 30 feet apart. Virgin forest, alluvial, and loamy soils appear to be equally suitable for this hardy tree.

32 Calophyllum inophyllum, LINN. *Kan.* Surahonne, Pinnay kai, Suragonne? Vuma, Wuma.

Fig.—*Bot. Plates Lal-Bagh Collection. Wight Ic. t. 77.*

References.—*Drury, Us. Pl.; Dict. of Econ. Prod. of Ind.*

The Alexandrian laurel is usually found as a small evergreen tree, but in some parts of the Malnad it attains to considerable size. The leaf, flower, and fruit all contribute to make it a handsome object worthy of, and usually occupying, a place in Indian gardens. It is also held in much esteem by the Hindus.

Wood reddish-brown, close-grained and moderately durable. Occasionally used for building and for agricultural implements. It also burns well. Pinnay oil, which burns well and possesses medicinal properties is expressed from the fresh seed. It is prepared to a considerable extent at Bombay, Travancore, and Tinnevelly. But if the latest European principles for extracting oils were adopted, this product would be greatly enhanced in value and would be worth producing on an extensive scale. The oil is locally used both for burn-

ing and as an external application in cases of rheumatism. The deliciously fragrant flowers are offered in the temples, while the whole tree is often planted within the precincts of the latter.

Cultivation.—Being a sub-maritime species, the *Surahonne* attains its best development near the sea, or where sea breezes will exercise their influence upon it. Seeds germinate freely, especially when the drupe is fractured, and there is no difficulty in raising stock. In inland situations a little coarse salt added to the soil does good. Plant at 20 feet apart.

33 Calophyllum Wightianum, WALL. *Kan.* Bobbe, Babbe, Kalpun, Kull-ponne.

Fig.—*Bedd. Fl. Sylv. t. 90. Wight Ic. t. 106.*

References.—*Pharm. Ind.; Dict. of Econ. Prod. of Ind.*

It is doubtful if this species extends so far east as Mysore, but it should be searched for on the boundary line. It is a pretty evergreen tree with a red edible fruit the size of a gooseberry. A translucent yellow gum exudes copiously from the trunk. The wood is said to be specially good for engineering work, being hard and solid. It is of a dark red colour when freshly cut.

34 Calophyllum tomentosum, WIGHT. *Kan.* Kuve, Siri pune kuve, Surponne bobbi.

Fig.—*Bedd. Fl. Sylv. Gen.* xxii.

References.—*Gamb. Man. Timb.; Dict. of Econ. Prod. of Ind.*

A lofty evergreen tree of the Western Ghâts, where it attains a maximum height of 150 feet. In Mysore it is mostly confined to the moist regions of the western Malnad, where it grows to a large size and is self-productive. It is the "Sirpoon," or "Poon spar" tree of the timber trade; and a reserved timber of the State forests.

Lovery states that the wood does not endure moisture or wet exposure long; and that its weight is 48 lb. per cubic foot. But Poon spars always command a good price in the market. They are in great demand on the western coast as masts for ships and native craft. In addition to a valuable timber, this tree affords a black opaque gum of doubtful utility, and a lamp oil. The latter, which is expressed from the seed, is used by the Singalese on a somewhat extensive scale.

Cultivation.—In the indigenous tracts the tree propagates itself extensively from scattered seed. Cultivation should not be attempted on the plains.

35 Mesua ferrea, LINN. *Kan.* Naga Sampage, Naga champa, Kasara.

Fig.—*Wight Ill. t. 127.; Wight Ic. t. 118.; Bedd. Fl. Sylv. t. 64.*

References.—*Fl. Brit. Ind.; Dict. Econ. Prod. of Ind.; Pharm. Ind.*

An exceptionally handsome tree of the hill country. English residents occasionally refer to it as the "iron wood tree," an appellation which is due to the great weight and extreme hardness of its timber. Leaves opposite, stiffly coriaceous, drooping, oblong-lanceolate, acuminate; average blade $5 \times 1\frac{1}{4}$ in. Flower 2—3 in. diam., pure white and deliciously fragrant. Fruit somewhat like a chesnut in size, form, and taste; said to be eaten by the people. The flowers have medicinal properties and smelling them much is supposed to cause ulceration of the nostrils. M. Venkatnarnappa remarks in his notes, that owing to the difficulty of manipulation the wood of *Nagasampage* is rarely used in this province for building. But the local superstition that it possesses a peculiar attraction for serpents has perhaps more to do with its

unpopularity than any other cause. The wood, when easily procurable, is highly prized for bridges and other works of engineering. It is of a reddish colour and weighs about 70 lb. per cubic foot. The oil afforded by the seed heals sores quickly and is a popular embrocation in rheumatism and stiff joints. An attar is prepared from the flower, and the tree is cultivated for the latter and for scenic effect. It is easily propagated from seed and grows well in the open glades of the Malnad.

36 **Pœciloneuron indicum**, Bedd. *Kan.* Ballagi, Ballangi.

Fig.—*Bedd. Fl. Sylv. t. 3.*

References.—*Flora of Brit. Ind.; Dict. of Econ. Prod. of Ind.*

This ornamental tree is practically confined to the evergreen sholas in the Western Ghâts. Being exceptionally hard and heavy, the timber is occasionally referred to as 'iron wood,' as in the case of *Nagasampage*. But there is some doubt whether the appellation applies correctly to this species or to the one immediately following. Both possess timber of about the same specific gravity, and both are common to the upper hill forests. It should be observed, therefore, that the whole tree, leaves, flowers, and fruit are proportionately larger in the species under notice. Flowers in numerous terminal panicles, fragrant and yellowish-white, sepals 5, petals 5, regular. Fruit the size and form of a damson plum. Except for rice pounders, agricultural implements, and perhaps walking-sticks, (see following species) the wood is little known and not generally utilised. But this is due, no doubt, to its hardness, weight, and inaccessible position. With the advent of railways, steam-saws, and foreign capital, the real value of these hard woods will be demonstrated.

37 **Pœciloneuron pauciflorum,** Bedd. *Kan.* Ballagi?

Fig.—*Bedd. Fl. Sylv. t. 93.*

References.—*Gamb. Man. Timb.; Fl. of Brit. Ind.*

A smaller tree than the foregoing and usually smaller in its prominent parts. The flowers are not plentiful, and there is a want of symmetry in the divisions of the calyx and corolla, which will enable forest officials to distinguish between this and the foregoing species. Sepals 4, of which 2 are enlarged, petals 6 in number. Fruit obpyriform when young, eventually the size and form of the large Jamoon, "*jum nerale kai.*" This tree is plentiful in the South Tinnevelly and Travancore districts, where Beddome found it on the banks of streams, but it is unknown to what extent it is produced in Mysore. The wood is described as being exceedingly hard, heavy, and red in colour. Walking-sticks are said to be made from it, but this requires verification. The celebrated 'Ballagi' stick is the product of one or other of these two species, and not improbably of both.

The *Pœciloneurons* are reproductive from seed. Their cultivation on the plains would prove unsatisfactory.

VIII. DIPTEROCARPEÆ.

38 **Dipterocarpus turbinatus,** Gaertn. *Kan.* Walivara, Challani? Guga?

Fig.—*Bedd. Forest Rep. 1864-5 p. 17.*

References.—*Dict. of Econ. Prod. of Ind.; Pharm. Indica.; Fl. of Brit. Ind.*

The wood-oil tree.

This is *D. indicus* of the old edition, but as specimens have not been seen, and district officers make no reference to the species, it is entered with some hesitation. It is a lofty evergreen tree of Eastern Bengal and the Eastern Peninsula, affording, from its oleo-resin, the product called "Garjan Balsam" or "Kanyin Oil." The wood-oil of the Malnad forests may be the product of this tree, which is easily recognised by its beautiful pinkish-white flower, three inches across, and pubescent nut with two upright wings. Heartwood reddish or dark-brown, hard, durable and adapted to receive a fine polish. A useful timber for engineering and mechanics. Gamble states that the best Burmese charcoal is made from this species and *D. lævis*; but in the Flora of British India, the latter species has merged into the one under notice. Gamble is therefore of opinion that the tree of the Western Ghâts (that is the Mysore tree) may prove distinct from either of the above. This is a matter which Malnad forest officials could easily decide by making an analysis of all the trees affording wood-oil. The oil is of commercial value, being classed as a minor product of the forest revenue. It is used medicinally, especially in the treatment of leprosy and other skin diseases, as a varnish and for paying the seams of country-made boats. The principal exports are from Burmah and the Andaman Islands. Delivered at Calcutta from the latter place, the price varies from three to five rupees per maund of 80 lbs. Fuller information is needed as to the number, condition and value of local trees.

39 Vatica Roxburghiana, Blume.

A moderate sized tree of the Western Ghâts. Uses not recorded. Herbarium specimens would be acceptable.

40 Shorea Talura, Roxb. *Kan.* Jalari, Jalada.

Fig.—*Bot. Plates Lal-Bagh Collection. Wight Ic.* 164.

References.—*Dict. of Econ. Prod. of Ind.; Fl. of Brit. Ind.; Drury U. Pl.*

The lac tree of Mysore. Confined to the deciduous tracts of the maidan. Abundant in the Anekal, Closepet, and Nundydroog Taluks, where the propagation of lac has been actively taken up by the Forest Department. In the first named Taluk, Mr. Bapu Rao, the Assistant Conservator of Forests, Bangalore District, is extending the propagation of both the tree and the insect very rapidly. Lac being in great demand this action cannot fail, in the course of a few years, to largely increase forest revenue. The method of propagation is to fasten small bundles of twigs, with young insects upon them, on to the upper limbs and branches of the unaffected trees. *Jalari* remains bare of leaf during the end of the cold season, after which it bursts into blossom and fills the air with its fragrance for some days. The pure white flowers are produced in abundant lax panicles, a little in advance of the young leaves. A plantation in full blossom is a glorious sight, and swarms with millions of bees and other honey-finders. In addition to lac, the species affords a kind of dammar. Wood yellowish, heavy and durable, capable of taking a good polish and not infrequently used for local building. Weight 54 lb. per cubic foot. It is a reserved tree of the first class.

Cultivation.—Easily raised from seed, but not very self-productive in all localities. Nursery stock should be transplanted into the field when the seedlings are a foot to eighteen inches in height. Pits 3×3 ft. Seedlings answer well in loam; they should be 25 to 30 feet apart.

41 Shorea robusta, Gærtn.

Fig.—*Bedd. Fl. Sylv. t.* 4.

The *Sál* or *Saul* tree of the tropical Himalaya. Cultivated in the Lal-Bagh, but not found in the State forests. Being, next to teak, the most valuable timber tree of India, its cultivation is desirable. Beddome remarks that seedlings are abundant in the Gumsoor forests.

42 Shorea Tumbuggaia, Roxb.

Fig.—*Bedd. Fl. Sylv. t.* 5. *Wight Ic. t.* 27.

An immense timber tree of the Cuddapah district, and possibly indigenous to the north-east boundary of Mysore. It should be searched for along the course of the North Pennar river. A kind of dammar is obtained from the trunk, and Beddome speaks well of the timber. Forest officials of the Kolar and Chitaldoorg districts should be on the look out for this tree.

43 Hopea parviflora, Bedd. *Kan.* Kiral boghi, Bogi, Tirpul, Tirpu.

Fig.—*Bedd. Fl. Sylv. t. 6.*

References.—*Dict. of Econ. Prod. of Ind.; Gamb. Man. Timb.*

A lofty tree of the evergreen sholas. On the plains of South Canara it is preferably used to build Hindu temples. Lovery writes, that in Shimoga the wood is prized for building carts and boats. Weight 62—63 lb. per cubic foot. Being so heavy and durable, Beddome thinks it is well suited for sleepers and gun-carriage work. For ornamental purposes this is a grand subject, but it is not likely to succeed on the plains under 2500 feet. It possesses the characteristic winged fruit of *Dipterocarpeæ*, by which trees of that Order are easily distinguished.

44 Hopea Wightiana, Wall. *Kan.* Kalbon ? Haiga ?

Fig.—*Wight Ill. t. 37. Bedd. Fl. Sylv. t. 96.*

References.—*Dict. of Econ. Prod. of Ind.; Drury U. Pl.*

A large evergreen tree of the upper sholas. In appearance and quality of timber it differs but little from the preceding species. Beddome remarks that it is a firstrate coppice firewood, but from all accounts the timber is much too valuable to be used as fuel. The inflorescence of this tree is often replaced by an echinate abortion resembling a young Spanish chesnut.

In addition to the above, the species *H. glabra*, and *H. racophlœa*, are possibly indigenous to the hill Flora of the province.

45 Vateria indica, Linn. *Kan.* Dupa, Dhupa, Maddi dupa, Google ?

Fig.—*Wight Ill. i. 88, t. 36. Bedd. Fl. Sylv. t. 84.*

References.—*Drury U. Pl. ; Fl. of Brit. Ind.; Grah. Ander. F. Trees.*

This is one of the grandest and best known trees of Southern India. Abundant in nearly all the forests of the Western Ghâts, where it affords the gum-resin known as "white-dammar" or "Piney-varnish." A fatty oil is copiously yielded by the seed, and utilised locally to make "Dhupa candles," in lieu of tallow. These candles burn slowly and brightly, and their preparation, in primitive moulds, is simple and inexpensive. Their preparation on a more extensive scale than at present is a matter for consideration, and will no doubt be regulated by the cost of production. On full exposure the oil solidifies rapidly. It is commonly used as a lamp-oil and in medicine. The resin, which is obtained by wounding the liber of the trunk, is also medi-

cinal, but is best known to the hill peasants as an incense and varnish. It is popularly known by the Tamil name *Vellai-kungiliyam.*

"When young, affords good shade, but coffee generally suffers in the vicinity of large trees. It grows to an immense size and yields a strong-scented resin, used as incense in temples.

The drupe (capsule) consists of a leathery covering of a dark-blue color, inclosing a very hard brown nut, with openings for three kernels, but generally containing only one or two, which are eaten by children and contain an oil which can be pressed out on the blade of a knife.

Timber very tough and cross-grained, not durable and readily decays if exposed to damp. Good for door planks but difficult to adze." *Graham Anderson.*

The Dhupa tree has white, fragrant flowers, nearly an inch across.

Cultivation.—Abundantly produced from seed, and only succeeding well in a moist alpine situation where the virgin soil is deep and rich. Useless for the dry plains.

IX. MALVACEÆ.

46 Malachra capitata, LINN.

47 Urena lobata, LINN.

48 Urena sinuata, LINN.

These are abundant undershrubs yielding fine, soft fibres. *Malachra* is not indigenous to Mysore, but is now spreading from the Botanical Gardens, where it has run wild.

49 Decaschistia trilobata, WIGHT, and **D. crotonifolia,** Wight, are common shrubs of the scrub tracts. Economic properties unknown. Garden brooms are popularly made from the twigs of *Sida carpinifolia*

var acuta, an undershrub of the maidan. See the Kanarese name *Bhimana kaddi*.

50 Hibiscus rosa-sinensis, LINN. *Kan.* Dasala.

The shoe-flower. So called as the flowers stain leather black and are occasionally used in lieu of blacking. It is not generally known that this introduced shrub forms an excellent fence and stands a great deal of pruning.

51 Hibiscus Abelmoschus, LINN. *Kan.* Kasturi bende.
52 H. esculentus, LINN. *Kan.* Bende.
53 H. Sabdariffa, LINN. *Kan.* Kempu pundrike.
54 H. cannabinus, LINN. *Kan.* Holada pundrike.

The above are introduced shrubs of annual duration. They are cultivated for their fibre, and medicinal properties, and are commonly found all over the country.

55 Hibiscus tiliaceus, LINN. *H. tricuspus*, Banks. and *H. elatus*, Sw. are introduced trees cultivated in the Lal-Bagh. The last named was presented to the Gardens some years ago by Mr. Marshall Woodrow of Poona, and the following extract from Fawcett's "Economic Plants in Jamaica" will reveal that it is a tree of promise.

"Hibiscus elatus, Sw. Blue or mountain Mahoe, Cuba Bark. Native of West Indies. A tree, 50 or 60 feet, with roundish leaves, large flowers of a purplish-saffron colour.

Bark.—Fibres make good ropes. The lace-like inner bark was at one time known as Cuba bark from its being used as the material for tying round bundles of Havanna cigars.

Wood.—Valuable to cabinet-makers ; best variety has the appearance of dark-green variegated marble. Leaves and young shoots mucilaginous; infusion used in dysentery."

Judging from the above, and other accounts, it is clear that this pretty wood is highly valued in the West Indies for articles of furniture, flooring, panelling and fancy work. The species has grown well at Bangalore and appears to be quite hardy.

Cultivation.—Local trees have not seeded, although they have flowered. Cuttings take root freely. Plant in fairly good soil at a distance of 20 feet apart.

56 **Thespesia populnea,** CORR. *Kan.* Asha, Hurvashi, Huvarasi, Kandasola.

Fig.—*Bot. Plates Lal-Bagh Collection. Wight Ic. t. 8 ; Bedd. Fl. Sylv. t. 63.*

References.—*Drury U. Pl.; Pharm. Ind.*

The Portia tree. Although naturally clinging to the sea-shores of India and Ceylon, this attractive evergreen tree is abundantly planted in Mysore. It does not, however, attain its normal size and beauty so far inland. But the large, cordate, shining leaves, intermixed at short intervals by solitary yellow flowers of a splendid size, make the species always very attractive. On the latter account it is much planted as an avenue tree. When raised from seed the timber is free of knots, straight, even-grained and tough, properties which adapt it for carriage-building and similar works requiring lightness and pliability. But raised from cuttings the tree becomes a gnarled deformity. The bark, fruit, and heartwood all possess medicinal properties.

Cultivation.—Propagate from seeds only, although cuttings of all sizes are easily rooted. The seedling nearly always becomes a fine tree, especially in the low country near the sea. For road avenues, plant in large pits at 35 to 40 feet apart, the seedlings being at least a foot high when so planted.

57 Gossypium arboreum, LINN. *Kan.* Kari Atti, Kari arale, Anji.

Fig.—*Bot. Plates Lal-Bagh Collection. Wight Ic. t. 10.*

References.—*Dict. of Econ. Prod. of Ind.*; *Fl. of Brit. Ind.*

A small tree of dark foliage and flowers; cultivated in gardens and in the vicinity of temples. Never cultivated in the field like ordinary cotton. The sacred thread worn by the Brahmins is chiefly made from the cotton of this species. Flowers dark crimson.

Cultivation.—Easily propagated from seed, and requiring no special treatment during growth. Around temples it is often self-productive.

58 Kydia calycina, ROXB. *Kan.* Bende naru mara, Bende, Bellaka.

Fig.—*Bot. Plates Lal-Bagh Collection. Bedd. Fl. Sylv. t. 3.*

This small tree is abundant in the mixed zone of dry forests. Never attaining a very large size, and often cut down for fuel. Wood white, consisting exclusively of alburnum. Weight 40 to 45 lb. per cubic foot. Seldom used except for ploughs, wooden ladles and spoons.

But the species affords a good fibre, and the mucilaginous bark is commonly used to clarify sugar. The pounded leaves are applied as poultices for certain skin diseases.

59 Adansonia digitata, LINN.

The Baobab or Lalo tree. This curious species, a native of tropical Africa, is cultivated in the Lal-Bagh.

60 Bombax malabaricum, D.C. *Kan.* Burga, Boorga, Buraga, Kempu burga.

Fig.—*Wight Ill. t. 29. Bedd.; Fl. Sylv. t. 82.*
References.—*Fl. of Brit. Ind.; Dict. of Econ. Prod. of Ind.*

An umbrageous tree of the deciduous and mixed zones. Ascending the Ghâts, it attains a magnificient size, the immense buttressed trunk often eliciting, from the tourist, expressions of admiration and surprise.

The timber, however, is soft, white, spongy, and, except under water, very perishable. It is utilised to a limited extent for planking, packing cases, toys and floats, &c. A medicinal gum exudes from the trunk, the latter being thickly covered with sharp spines, which eventually become blunted and scattered as the tree ages.

G. Anderson states that the thorns are sometimes chewed by the hill people. The fine hairs (floss) which cover the seed constitute "silk cotton," and it should be observed here that *Bombax malabaricum* is the red-flowered silk-cotton tree. This distinction is necessary as there are two other trees, having white and yellow flowers respectively, which produce floss of nearly the same quality also known as "silk cotton."

Of the latter, the white-flowered species, *Eriodendron anfractuosum*, produces the article (floss) known on the continent of Europe as *Kapok*. The other silk cottons, including the one under notice, are inferior to *Kapok*.

The large red flowers of this tree appear in great profusion on the naked branches in February and March, the species is then a conspicuous object in many parts of the dry forest zone.

A few weeks later the ground underneath will be whitened with snowy floss.

Cultivation.—Seeds germinate to the extent of 20 %, but as they are greedily eaten by squirrels and other field vermin, precautions are necessary to preserve and collect them. In nature the tree throws up a great many root suckers, some of which replace the original stem. Plant seedlings in large pits at 50 feet apart. The soil should be deep and porous.

61 Eriodendron anfractuosum, D.C. *Kan.* Bili burga, Burga, Bili barlu.

Fig.—*Bot. Plates Lal-Bagh Collection. Wight Ic. t. 400.*

References.—*Dict. of Econ. Prod. of Ind.*; *Off. guide R. G. Kew.*; *Drury U. Pl.*

The Kapok tree of Java. Also the white-flowered silk cotton tree of the West Indies, tropical America, Africa, and other countries. It is plentiful in Java, from whence Kapok is exported to Europe and Australia. In this country it is sparsely found in cultivation about temples, or in woods near towns and habitations. It is rarely found in the primeval forests of India. A much smaller tree than *Bombax malabaricum*, although the trunk bears some resemblance to the latter in being tall, muricated, and, in large specimens, buttressed. But it is not such a wide-spreading tree, and the creamy-white flowers, less than half the size of the flowers of *Bombax malabaricum*, at once determine the species. The floss, or silky hairs borne on the seed, is the true Kapok of commerce, which is extensively used for stuffing mattresses and pillows, and estimated to be as good for the purpose as feathers. Similar but inferior products (silk cotton) are afforded in Mysore by the following species :—

Bombax Malabaricum.
Cochlospernum gossypium.
Calotropis gigantea.
Cryptostegia grandiflora.
Hoya viridiflora.

Wood of little value, being porous, soft, and very subject to the attacks of insects. It may be greatly improved however, like other soft woods, if steeped for a few days in strong lime water. Weight 30 lb. per cubic foot. Used for the construction of toys and canoes. Medicinal properties are possessed by the roots, as also the gum which exudes from the liber.

Cultivation.—Exactly the same as for *Bombax*, only that the seedlings may be planted closer, say 30 feet apart.

62 Lagunaria Patersoni, Don.

An Australian tree cultivated in the Botanical Gardens. Having a whitish, evergreen foliage, and being of conical growth, the species is effective for grouping with other trees.

"Diameter 18 to 30 inches; height, 40 to 60 feet. Found on the alluvial river banks of the Don River, Port Denison; timber white, close-grained, easily worked and used for building purposes."

Walter Hill.

63 Durio Zibethinus, DC.

The Durian tree. The several attempts made to establish this species in the Lal-Bagh have resulted in failure. It requires moist tropical heat.

X. STERCULIACEÆ.

64 Sterculia fœtida, Linn. *Kan.* Penari, Bhatala, Jaynkatala.

Fig.—*Bot. Plates Lal-Bagh Collection. Wight Ic. t. 181 and 364.*

References.—*Fl. of Brit. Ind.; Dict. of Econ Prod. of Ind.; Pharm. Ind.*

A deciduous tree having its branches in horizontal tiers. Leaves digitate and borne mostly at the ends of the branchlets. Flowers appear in the

hot weather in advance of the young leaves, and are onspicuous by their disagreeable odour. Trunk long and straight, furnishing spars for native craft in some parts. The wood is lasting and takes on a good polish. The large almond-like seeds are eaten, on which account the species may occasionally be determined through the vernacular names for the "country almond." It should not, however, be confounded with *Terminalia catappa*, which affords the proper country almond, so called. An oil is expressed from the seed; and the bark and leaves possess medicinal properties.

Cultivation.—Propagate from seeds, and plant out the following year when the seedlings are a foot to eighteen inches in height. Growth is slow and stunted except in deep fertile soils, where there is perennial moisture.

65 Sterculia urens, Roxb. *Kan.* Kempu dale, Penari?

Fig.—*Bot. Plates Lal-Bagh Collection.*

References.—*Fl. of Brit. Ind.; Pharm. Ind.; Dict. of Econ. Prod. of Ind.*

A medium sized tree having soft wood covered by a whitish outer bark of a thin papery nature. Leaves palmately 5-lobed, mostly at the ends of the branches. Flowers small, yellowish. Follicles (fruit) armed with stinging bristles. The gum which exudes from the trunk and limbs has a local market value of about 12 rupees per cwt. It is said to be used for native sweetmeats and as a substitute for tragacanth. An oil is expressed from the seed, and the latter is eaten in lieu of almonds.

66 Sterculia villosa, Roxb. *Kan.* Massi, Bili dale mara.

"A large tree found in the Malnad, but very scarce. Wood firmly close-grained and fit to be worked up and polished. Good for building and furniture." *Lovery.*

This is also a whitish-barked tree with palmate aves and pendulous flowers of a pinkish colour. ender shoots, under side of the leaves and young uit downy, with a rusty-villous tomentum. The ooping panicles, and the absence of bristles on the uit, are characters that will help to determine this ecies from the one immediately preceding. Herba-ım specimens would be appreciated at head-quart-s.

Sterculia guttata, Roxb. *Kan.* Jaynkatalu?

Fig.—*Bot. Plates Lal-Bagh Collection. Bedd. Fl. Sylv. t. 105 ; Wight Ic. t. 487.*

References.—*Fl. of Brit. Ind.; Dict. of Econ. Prod. of Ind.*

A fine tree of the Malnad. Described by Beddome a beautiful object when covered by its bright red psules (follicles). Bare of leaf during the cold ason. Bark ash coloured and very fibrous, utilised the Western Coast for making cordage, as also ıgh articles of clothing. The tree flowers in bruary in advance of the young leaves. Flowers ddish-purple, hairy, and slightly fœtid. Fruit the e of a small egg, follicular and bright red. This probably the species called *Jaynkatalu* in the cond edition. Nothing is known of the wood, hough the tree is not uncommon in the deciduous d mixed zones skirting the Malnad.

Cultivation.—The tree grows well in the Lal-Bagh, ıere the soil consists mostly of a deep loam in-rporated with oxide of iron. It would not suc-ed in a very dry situation. Seeds germinate ely. Plant at 35 feet apart. Highly ornamental.

Sterculia Balanghas, Linn.

Specimens have not been received of this species, t there is little doubt of its presence in the north-st frontier, where it should be searched for. It is ured in Wight's Ill, t. 30.

69 Sterculia alata, Roxb.

Fig.—*Bot. Plates Lal-Bagh Collection. Bedd. Fl. Sylv. t. 230.*

References.—*Bedd. Fl. Sylv.*; *Fl. of Brit. Ind.*

This fine tree is deciduous for a few days at Bangalore, but in the sholas of the Western Ghâts it is probably evergreen.

Leaves stout, alternate, long petiolate, cordate, ovate, entire; petiole $3\frac{1}{2}$ in., slightly thickened at the point of junction with the blade, the latter 9×6 in. on the average.

The pedicels, flower buds and outer calyx, are colored a beautiful golden-green, while the inner face of the calyx is burnt carmine. The follicle (fruit) is 4—5 inches in diameter and nearly round.

The economic properties of this tree are unknown. A solitary specimen in the Botanical Gardens has attained a height of 50 feet in 25 years. It flowered for the first time in April of the current year (1893) and one half-formed fruit is now visible near the summit.

70 Sterculia populifolia, Roxb.

A small evergreen tree with smooth greyish bark and poplar leaves. Flowers like little cups, marbled cream and rose. Unless they appear under purely vernacular names, the forest lists are strangely deficient in *Sterculias.*

71 Sterculia acerifolia, Cunn.

An Australian tree cultivated in the Lal-Bagh. Maple-leaved and evergreen. Flowers bright crimson, in drooping panicles.

72 Heritiera littoralis, Dryand.

The looking-glass tree. So called on account of the beautiful frosted appearance of the under side of the leaf, on which shadows are clearly reflected. A

small gregarious tree of the Indian littoral, extending inland as far as Cachar and the Khasia Hills; a doubtful native of Mysore, but cultivated in the Botanical Gardens, where it fruits abundantly. Although small, the wood is highly spoken of and commands a high price in the forests of the Sundarbans. It weighs 65 lb. per cubic foot, and is very durable.

Cultivation.—Each woody capsule contains one large seed, but unless the latter is set free by cutting off the top of the capsule, germination will take two or three years, so tenacious is the fruit. Sown with opened capsules, the seeds germinate in the course of a few weeks. Plant in sandy soil, if a little saline all the better, at 15 to 20 feet apart. When nicely grown the species is distinctly ornamental.

73 Kleinhovia Hospita, LINN.

A small but very ornamental tree, cultivated in the Lal-Bagh. Used for avenues in Calcutta and Poona. In Java, where the species seems to attain a larger size than in India, the old wood is held in value.

Cultivation.—Seeds taken from local trees have not germinated. Layers can be removed, but it is a slow process which does not succeed in every attempt. Being a very bushy tree with branches down to the ground, it makes a fine central object in a large shrubbery.

74 Helicteres Isora, LINN. *Kan.* Yedamuri, Kavargi.

Fig.—*Bot. Plates Lal-Bagh Collection. Wight Ic. t. 180.*

References.—*Dict. of Econ. Prod. of Ind.; Gamble Man. Timb.*

The country screw-tree. So called from the fact of the fine slender carpels being twisted together spirally, so as to resemble a cork-screw.

A large bush or small tree, which, in foliage and bark, reminds one forcibly of the English hazel.

Cultivated in the Lal-Bagh and found wild in the dry forests. An excellent bast-fibre is obtained from the inner bark. Medicinal properties are attributed to the root and fruit. The latter is also used as a charm in connexion with marriages, and to preserve infants from bowel complaints.

In the Himalayan District, where the shrub abounds, the fruit commands a trade price of Rs. $3\frac{1}{2}$ per Surat maund of $37\frac{1}{2}$ lbs.

The flower, which opens red, changes in the course of 24 hours to orange and lead colours. Wood white, soft, weighing 35 lb. per cubic foot.

As a likely source of bast-fibre, this species deserves attention. It is easily increased from seed and requires no pampered cultivation.

It commends itself too as a durable fence to landed properties.

75 Pterospermum suberifolium, LAM.

A small tree of the western Malnad. Specimens and local information required.

76 Pterospermum Heyneanum, WALL.

77 P. glabrescens, W. & A.

78 P. obtusifolium, WIGHT.

These are trees of which specimens are not forthcoming, although the species are, perhaps, not uncommon in the western frontier of Mysore. It may be remarked here, that vernacular names given without herbarium specimens of the trees referred to, are of no value for identification.

79 Eriolæna Candollei, WALL.

Fig.—*Bot. Plates Lal-Bagh Collection.*

This deciduous tree, which is cultivated in the Botanical Gardens and presumably wild in the Western Ghâts, appears to deserve more attention

than it now receives. With cordate shining leaves, and numerous large, yellow, flowers, it is also a distinct and handsome species.

"Heartwood brick-red, with orange and brown streaks, old pieces, however, losing their bright colour; hard, close-grained, shining, takes a beautiful polish, seasons well. Weight about 50 lb. per cubic foot. It is used for gunstocks, carpentry, paddles, and rice-pounders; is very handsomely marked, and is well worthy of greater attention."
Dict. of Econ. Prod. of Ind.

This tree can be propagated from seeds and cuttings.

80 Melochia velutina, Bedd.

Fig.—*Bedd. Fl. Sylv. t. 5; Wight Ic. t. 509.*

References.—*Kurz. For. Fl. Burm.; Gamble Man. Timb.*

A small evergreen tree occasionally seen in cultivation and said to be widely distributed through the warmer parts of India, Andaman Islands, and the Malay Archipelago.

Wood soft and useless except for floats and toys. The liber affords a strong fibre which is valued for cordage. The turtle-net of the Andamans, called *yoto-tepinga-da,* is composed of this cordage.

This species is rendered conspicuous among other trees by its whitish leaves. It is short-lived, and very subject to the attack of white ants. Seeds germinate badly as a rule.

81 Abroma augusta, Linn.

Fig.—*Bedd. Fl. Sylv. Anal. Gen. t. 5.*

A hairy shrub of the warmer parts of India, Java, and the Moluccas. Cultivated in gardens. An excellent fibre is obtained from the inner bark, (liber)

and as the plant thrives well in Mysore, it is suggested that more attention might be given to its special cultivation. Seed can be supplied from the Botanical Gardens, as also instructions for proper treatment.

82 Guazuma tomentosa, KUNTH. *Kan.* Rudrakshi.

Fig.—*Bot. Plates Lal-Bagh Collection. Bedd. Fl. Sylv. t. 107; Wight Ill. t. 31.*

References.—*Dict. of Econ. Prod. of Ind.; Econ. Pl. Jamaica.*

This forage tree of the West Indies and tropical America, is spreading rapidly in this country Naturalised in Mysore, but mostly found in gardens and near habitations. The leaves and fruit are much relished by cattle and the possession of village topes of the tree would be of great utility in times of drought or famine, when the surface herbage is consumed.

The 'Rain Tree' *Pithecolobium saman,* should be included in such topes, as also the 'Atti,' *Ficus glomerata,* and other species affording nutritious food in times of scarcity. The tubercled capsule, the size of a gooseberry, becomes purplish-black when ripe, and falls from the tree in great numbers. The writer has seen his own cows running for half a mile to secure this fallen fruit. Medicinal properties are attributed to the bark.

In the West Indies the tree is called the 'Bastard Cedar.' The timber of old trees is said to be durable, although it is light and apt to split. Weight 32 lb. per cubic foot. Not commended for avenue planting as the clean trunk is usually very short, while the average height of the tree is not more than 35 feet.

Cultivation.—When liberated from the woody capsule the seed germinates quickly, but buried with

the capsule intact they will require years, or may never be heard of again. Plant established seedlings at 30 feet apart. The larger the pits can be made, the better.

83 Theobroma cacao, LINN.

The cocoa or chocolate tree. Indigenous to tropical America. Cultivated in the Lal-Bagh, and sparsely grown in some of the coffee districts. A small evergreen tree with small clusters of pinkish flowers given forth from the trunk and limbs. The flowers are succeeded by ovate-angular fruits 9×4 in., yellow to chocolate in colour. When in fruit, the tree is a striking object. The seeds, of which each capsule (fruit) contains 25—35, each the size of a small marble, afford the material for cocoa and chocolate. This important species succeeds best when under the influence of sea breezes. It has been largely propagated in and widely disseminated from the Bangalore Botanical Gardens.

84 Cola acuminata.

The Kola-Nut tree of West Africa. This economic species has recently been introduced.

XI. TILIACEÆ.

85 Berrya Ammonilla, ROXB.

Fig.—*Bedd. Fl. Sylv. t. 58; Wight Ill. t. 34.*

References.—*Fl. of Brit. Ind.; Dict. of Econ. Prod. of Ind.*

A deciduous tree of medium size. Cultivated in the Lal-Bagh, where it grows very slowly. The flowers appear with the young leaves in May or June, in ample terminal panicles, pinkish-white. The six-winged capsule is characteristic, and the pilose seeds cause intolerable itching when much handled.

Heartwood dark red, hard, sweaty, and durable. Weight 50 to 62 lb. per cubic foot. Commands a

steady market value under the name of "Trincomalee wood." It is abundant on the south-east coast of the Madras Presidency, Ceylon and parts of Burmah. The species seeds freely and attains its best growth within the active influence of the sea air.

86 Grewia tiliæfolia, VAHL. *Kan.* Thadsal, Tadasalu, Thadasal.

Fig.—*Bedd. Fl. Sylv. t. 108.*

References.—*Brand. For. Fl.; Dict. of Econ. Prod. of Ind.*

A deciduous tree of medium size. Plentiful in the mixed zones of Mysore and North Coorg, also in the drier parts of the Malnad.

Of the 36 species of *Grewia* described in the Flora of British India, nearly the half are indigenous to this province and to the Western Ghâts. A few are trees, but the greater part are enormous woody climbers or shrubs. They are all characterised by alternate, simple leaves of moderate size; fibrous inner bark (liber) containing mucilage; shortly paniculate or cymose inflorescence and drupal fruit of a fleshy or woody nature. The flowers are mostly yellow, but occasionally white or pale yellow. The fruit is round, turbinate, or lobed. In a few species it is edible.

The tree under notice is well known for its wood, fibre and fruit. Lovery describes it from the Shimoga forests as follows :—

"Wood light reddish brown, compact, close-grained, durable, elastic and easily worked. Valuable where strength and elasticity are required. Used in cart and carriage building, also for masts, oars and shafts. Weight 35 lb. per cubic foot. Fruit eaten."

Anderson adds that "the wood is fibrous, tough and hard to work, used for beams, posts and bed-plates. The bark yields a fibre which makes good lining-ropes after the sticky mucilage has been properly removed."

Cultivation.—Propagate from seed and cuttings either of which will raise nursery stock. When 15—18 inches high, plant the seedlings or rooted cuttings at a distance of 25 feet apart. The species grows fairly well in any part of Mysore, but with most vigour near the hills.

87 Grewia oppositifolia, Roxb. *Kan.* Butale.

Fig.—*Wight Ic. t. 82.*

A moderate-sized tree of the drier zones. Pretty common in Shimoga and other parts of the Malnad where the forest is open. Wood white, with a small percentage of irregular heartwood which exhales an unpleasant odour when freshly cut or burned. Weight 45 to 50 lb. per cubic foot. In Shikarpur the low caste people are superstitious about using the wood as the idol *Mari* (goddess of small-pox) is commonly made from it. The inner bark affords a coarse fibre of some utility. It is doubtful if the fruit is eaten, but the seeds are used by children and the lower classes for garlands. Goats and sheep like to browse on the tender foliage of the tree. In this connection it may be remarked that all the *Grewias* are good forage plants.

Cultivation.—The same as for the preceding species.

88 Grewia asiatica, Linn.

A small tree, cultivated in some parts of India for its acid fruits. Wood tough and elastic, weighing 43 to 51 lb. per cubic foot. In the north of India it is used for a variety of minor purposes.

89 Grewia lævigata, Vahl. *Kan.* Kaori, Karkiselli ?

A small tree of the Western Ghâts, which is said to afford a superior fibre.

90 Grewia columnaris, Sm. *G. pilosa*, Lam. and *G. emarginata*, W. & A. are large woody climbers of the reserved jungle. Other species are badly authenticated, and require fuller investigation in the field. The growth of these plants should be encouraged where natural herbage is deficient as their leaves are relished by most cattle, and, no doubt, afford nutrient food.

91 Erinocarpus Nimmoanus, GRAH. *Kan.* Kadubende, Haladi, Adavi.

Fig.—*Bedd. Fl. Sylv. t. 110.*

References—*Gamb. Man. Timb.*; *Fl. of Brit. Ind.*

A medium-sized tree with rather large, yellow, flowers, in terminal panicles. Not uncommon in Hassan in the mixed zone. The bark yields a good rope-fibre. Wood of little value. Herbarium specimens are wanted.

The fibre-yielding genera *Triumfetta* and *Corchorus*, are well represented in the forest reserves; but the jute plant, *Corchorus capsularis*, is not indigenous to Mysore.

92 Elæocarpus serratus, LINN. *Kan.* Perinkara.

This tree is somewhat rarely found on the western boundary; and may be recognised by its edible fruit, which is of the size and form of a small olive. The fruit imparts an agreeable acid flavour to vegetables, is eaten with curries, and pickled in oil for general use. The genus *Elæocarpus* is pretty clearly marked by the laciniated petals of the flower, which is an unusual condition in the family.

93 Elæocarpus oblongus, GÆRTN. *Kan.* Hanaltadi.

Fig.—*Wight Ic. t. 46.*

A lofty tree of the Malnad. The local economy of this species is unknown, but Graham Anderson gives the following remarks under the vernacular appellation "Hanal Taree," which may be applicable to the tree under notice.

"A very lofty, deciduous tree, with extremely large buttresses at the base of the stem. Generally growing in moist ravines. When young, the plants somewhat resemble those of the *Jack*, or *Hulsen*. The wood is very soft and perishable." In drawing attention to the saccate glands seen on the under surface of the leaves in this and other species of *Elæocarpus*, Masters suggests that they may be the result of insect agency.

94 Elæocarpus tuberculatus, Roxb. *Kan.* Rudrak, Rudrakshi, Dandla.

Fig.—*Bedd. Fl. Sylv. t. 113. Wight Ic. 62.*

References.—*Roxb. Fl. Ind.*; *Fl. of Brit. Ind.*

A magnificient tree of south-west Mysore, and Coorg. The obovate-serrate leaves are often a foot in length by 4—5 inches in width, crowded towards the ends of the branches. The species should not be confounded with *Guazuma tomentosa,* an introduced tree, which has recently acquired the same vernacular name, 'Rudrakshi,' owing to a resemblance in the tubercled fruit. But on close inspection it will be seen that the fruits are quite different, and the one under notice is usually worn as a charm or rosary by the *fakirs* of the country. It is believed that the finest nuts of the kind, however, are obtained from *Elæocarpus Ganitrus,* a tree of Nepal, Chittagong and the Malay Archipelago. They are the "Utrasum beads" of the Shivas. There are few trees more ornamental than this one, but the species clings to the moist region of the lower Ghâts and would be of no value on the plains of India. The quality of the timber is

not reported; neither do we know anything of the cultivation of this fine tree.

95 **Elæocarpus rugosus,** Roxb.

Fig.—*Wight Ic. t. 61.*

A tree of Coorg and the Western Ghâts. Uses unknown.

96. **Elæocarpus ferrugineus,** Wight.

This tree is likely to be found at the highest elevations on the western boundary. *E. Munroii,* should also be looked for. Although known to be ornamental trees, the local industrial value of the genus is still a matter for investigation.

XII. LINEÆ.

97 **Erythroxylon monogynum,** Roxb. *Kan.* Devadaru, Devadarum, Adavigoranti.

Fig.—*Bot. Plates Lal-Bagh Collection. Bedd. Fl. Sylv. t. 81.*

References—*Dict. of Econ. Prod. of Ind.*; *Pharm. Ind.*

A small tree or bush, according to situation. Known to many people as the 'red cedar' and 'bastard sandal,' plentiful in dry forests and ascending the minor Ghâts. The heartwood, which is hard and fragrant, is said to afford an oil of some value.

Beddome calls it "an empyreumatic oil." The leaves and bark are medicinal. Excellent charcoal is made from the wood. The red berries, the size of currants, are not unpleasant to the palate.

Cultivation.—Self-productive, and easily propagated from seed for artificial treatment. Among rocks and in poor soils the growth is rarely arborescent.

98 **Erythroxylon coca,** Lam.

This South American shrub is being rapidly established in Mysore, and other parts of India.

Cocaine is the active principal of its leaf. Plants may be seen in the Botanical Gardens.

XIII. MALPIGHIACEÆ.

99 Hiptage Madablota, GÆRTN. *Kan.* Adaraganchi hambu.

An immense woody climber of the reserved tracts. Affords good shelter for large game. When obtainable, the large creamy-white flowers are used for *puja*, owing to their delicious fragrance. The wood is said to be tolerably hard, and sections of the woody stem make good handles for tools. Medicinal properties are attributed to the leaves.

XIV. ZYGOPHYLLEÆ.

100 Guaiacum officinale, LINN.

The Lignum Vitæ tree. This small tree is cultivated in the Lal-Bagh, where, however, it does not attain its full size. It will succeed in this country, as it does in the West Indies, near the sea. The wood is remarkably dense, hard, and durable; commands a high price in the west, and is much used for pulleys, blocks, pestles, rulers, skittle balls and such small articles as require to combine great strength and durability with finish and elegance.

XV. GERANIACEÆ.

101 Averrhoa Carambola, LINN. *Kan.* Kamarak. **Fig.**—*Bot. Plates Lal-Bagh Collection.*

A small evergreen tree of 15 to 20 feet. Naturalised in Indian gardens, and supposed to have been originally introduced from America by the Portuguese. The angular fruit has a pleasant acid flavour, and is extremely juicy and refreshing. It is occasionally stewed, curried, and pickled, but more commonly used in the raw condition when persons are out for enjoyment.

There are two distinct varieties in local cultivation, one being small and sweetish, while the other is larger, coarser, and very sour.

Two crops are borne during the year, the first in the hot season and the second in September and October. The pinnate leaves are sensitive to the touch.

Cultivation.—Unless the seeds are well matured on a reserved tree, they either do not germinate at all, or the seedlings soon damp off. This is especially the case with the small, sweet-fruited variety. Plant at 20 feet apart, irrigate during periods of drought, and manure heavily once a year during the south-west monsoon. The land between the trees should be kept open and free of weeds.

102 Averrhoa Bilimbi, LINN.

Fig.—*Bot. Plates Lal-Bagh Collection.*

A small evergreen tree bearing somewhat similar fruit to the above, but not angular, and too acid to be eaten raw. The fruit is cylindrical, has a peculiar soapy feeling, and is much esteemed for pickling. Nevertheless, the two species are much confounded and many persons mistake the one for the other. The pinnate leaves of *A. Bilimbi* are longer than in the preceding species, and have usually 15 to 17 pairs of leaflets. The crimson flowers are said to make a good preserve.

Cultivation.—The same as for *A. Carambola.*

XVI. RUTACEÆ.

103 Zanthoxylon Rhetsa, DC. *Kan.* Jimmi mara.

A small corky-barked tree of the Western Ghâts, usually very prickly. The carpels and root-bark possess pungent and aromatic properties. Good herbarium specimens would be an acquisition at head-quarters.

104 Toddalia aculeata, Pers. *Kan.* Kadu Menasu.

Fig.—*Bot. Plates Lal-Bagh Collection. Wight Ill. t. 66.*

Reference.—*Pharm. Indica.*

A scandent prickly shrub of the maidan. Abundant in waste land and partial to the vicinity of rocks and loose boulders, which it often grows around and partly conceals. The whole plant is very pungent but especially the small golden berries, the size of a red currant. Useful medicinal properties are attributed to the root and fruit. On being distilled the green leaves afford a limpid oil having the odour of citron peel. The plant is easily propagated from seed, and, properly handled from the beginning, it forms a pretty hedge.

105 Glycosmis pentaphylla, Correa. *Kan.* Guroda.

An evergreen bush of the hill tracts. The white berries, the size of a pea, are eaten. It is believed in parts of Bengal, that the leafy twigs serve to ward off lightning.

106 Murraya exotica, Linn. *Kan.* Angarakana gida.

China box. This evergreen shrub is cultivated in gardens for its pretty white flowers, which are also very fragrant.

The wood is said to be suitable for wood-engraving, although somewhat liable to crack. It is very hard, and weighs 62 lb. per cubic foot; always small, but beautifully marked. Used by the Malays to make handles to their knives.

107 Murraya Kœnigii, Speng. *Kan.* Kari bevu.

Fig.—*Bot. Plates Lal-Bagh Collection. Wight Ic. t. 13.*

References.—*Dict. of Econ. Prod. of Ind.*; *Pharm. Ind.*

The curry-leaf tree. So called as the aromatic leaves are commonly used in Indian curries, and as a condiment in other food preparations. Cultivated and wild in most parts of the Province. Leaves deciduous in the cold season. Wood close, even-grained, hard and durable; used for agricultural implements. Weight 43 lb. per cubic foot. Aromatic trees of this class should be planted extensively in crowded localities as they are known to possess antiseptic properties.

Cultivation.—Seeds germinate freely under partial shade. Plant seedlings at 15—20 feet apart in any soil of fair depth and quality. The young trees should be watered occasionally during the two succeeding dry seasons.

108 Clausena Wampi, Blanco.

Fig.—*Bot. Plates Lal-Bagh Collection.*

This small fruit tree is cultivated in the Botanical Gardens, and in the Gardens of His Highness the Maharaja. Being a recent introduction, the fruit is scarcely known, it is, however, pleasantly acid and very refreshing. Two or three crops are produced annually.

Cultivation.—Healthy seedlings in pots, should be planted in irrigable land during the S. W. monsoon, at 15 to 20 feet apart. Although not a very gross feeder, the fact of several crops of fruit being borne annually, demands that fairly rich soil, and considerable quantities of manure should be available for this cultivation. The experiment of grafting upon allied species has not been tried.

109 Clausena indica, Oliv.

A small fruit tree of the Western Ghâts. Should be looked for within the Mysore territories.

110 Clausena Willdenovii, W. & A. *Kan.* Kadu Karabe.

Fig.—*Bot. Plates Lal-Bagh Collection.*

A common bush in the scrub tracts. The fruit is generally eaten by the people.

111 Triphasia trifoliata, DC. An ornamental shrub cultivated in the Botanical Gardens. The fruit preserves fairly well.

112 Limonia acidissima, LINN. *Kan.* Nai-bel? Nai-bela?

Fig.—ROXB. *Cor. Pl. t. 86. Bedd. For. Fl. Anal. Gen. xlv.*

References.—*Pharm. Ind.*; *Dict. of Econ. Prod. of Ind.*

This is a spiny, glabrous bush, or rarely a small tree. Spines numerous. Leaves tripinnate, petiole winged and jointed. Berry the size of a marble, exceedingly acid; possesses medicinal properties, and is used in some parts in lieu of soap. The species is most abundant in the dry forests of eastern Mysore and at Nundydroog. Wood yellow, hard and worthy of attention for the lathe. "Considered protective against contagion, and an antidote to venomous poisons." Weight 59 lb. per cubic foot. Lovery states that it affords good fuel.

Cultivation.—Easily raised from seed. Natural growth is mostly confined to dry hills among rocks and scrub. Soil gravelly, and rather poor in vegetable matter.

113 Atalantia monophylla, CORREA. *Kan.* Kadu nimbe, Adavi nimbe, Nai byalada, Katu nimbe ?

Fig.—*Wight Ic. t. 1611. Bot. Plates Lal-Bagh Collection.*

The wild lime. A small tree, or when favorably situated in relation to larger trees, a woody climber. Indigenous to the hills, but occasionally cultivated in gardens for ornament. Flowers white, fragrant,

scattered all over the tree. Fruit globular, the size of a plum, golden-yellow and very attractive when ripe. A sweet smelling oil is prepared from the fruit. Wood yellow, hard, close-grained; weighing 65 lb. per cubic foot.

114 Atalantia racemosa, W. & A.

A small tree nearly allied to the above and somewhat similar in appearance.

115 Citrus medica, LINN. *Kan.* Nimbe, Limbu, Madalada, Madavala.

Fig.—*Bot. Plates Lal-Bagh Collection. Or. and Lem. of Ind. and Cey. Bonavia.*

References.—*Dict. of Econ. Prod. of India.; Fl. of Brit. Ind.* ; *Pharm. Ind.*

The citron tree. A small evergreen tree or shrub, according to variety. Flowers numerous, large, white or often tinted reddish. Fruit large, nearly globular, oblong or obovoid; rind thick, often coarsely mamillate or furrowed, turning yellow when ripe. The rind affords an essential oil which is used in medicine and perfumery; it is also candied and enters largely into confectionery. The leaves and flowers are also oil-producing, while the fruit is used medicinally. There are many varieties of the citron, for an account of which see Dr. Bonavia's work on the genus *Citrus*.

Cultivation.—Operate in rich land, with a sufficiency of water and plenty of rotted dung. Under proper treatment the yield of fruit is heavy, but it falls off in proportion to the inferiority of the latter. Grafting is easily accomplished with sizable seedlings of the different varieties, or upon orange and pumelo stocks.

The citron, lemon, sour lime and sweet lime, are now looked upon as varieties of a common species

and they all require proper cultivation to attain good crops of fruit.

116 Citrus medica var. Limonum, HOOK. FIL. *Kan.* Herile.

Fig.—*Bot. Plates Lal-Bagh Collection.*

References.—*Fl. of Brit. Ind.; Pharm. Ind.; Dict. of Econ. Prod. of Ind.; Or. and Lem. of Ind. and Cey. Bonavia.*

The lemon tree. More usually a shrub cultivated in gardens. Flowers pinkish-white to pure white; solitary or clustered. Fruit roundish or oval, smaller than the citron and with a smoother rind. The latter becomes yellow when ripe, and is much pickled throughout the country, it also affords essence of lemon and enters largely into medicine, confectionery and perfumery. Citric acid is prepared from the juice of the fruit and forms a distinct product. Lemon juice is universally used in sherbets and other cooling drinks. The Malta lemon, which has recently been introduced, is cultivated about Bangalore and fruits freely. There are many varieties.

117 Citrus medica var. acida, ROXB. *Kan.* Nimbe.

Fig.—*Bot. Plates Lal-Bagh Collection.*

References.—*Bonavia's Or. and Lem. of Ind. and Cey.; Dict. of Econ. Prod. of Ind.; Pharm. Ind.*

Sour lime of India. The presentation of this fruit to a superior is universally looked upon as a mark of profound respect and sincere friendship. Fruit globular, the size of a crab apple and turning pale yellow when ripe. Produced in great abundance on a rather dense thorny bush or small tree.

Lime juice is largely used in medicine, cookery, perfumery and sherbets. Bonavia draws special attention to the utility of this fruit when preserved and pickled. Dried fruit is exported to Egypt and

Arabia, where it is much relished as a condiment with fish, meats and such like. The tree is cultivated in nearly every Indian garden, and is easily raised from seed like all the species and varieties of the genus *Citrus.*

118 Citrus medica var. Limetta. *Kan.* Gaja nimbe.
Fig.—*Bot. Plates Lal-Bagh Collection.*

References.—*Bonavia's Or. and Lem. of Ind. and Cey.; Dict. of Econ. Prod. of Ind.; Pharm. Ind.*

The sweet lime of India. A shrub or small tree confined to garden cultivation. Fruit round, larger than the country orange; thin skinned; much used for pickling.

119 Citrus Aurantium, LINN. *Kan.* Kittale.
Fig.—*Bot. Plates Lal-Bagh Collection.*

References.—*Flora of Brit. Ind.; Pharm. Ind.; Dict. of Econ. Prod. of Ind.; Bonavia's Or. and Lem. of Ind. and Cey.*

The orange tree. This beautiful fruit tree is not extensively grown in Mysore, although it succeeds well in the adjoining province of Coorg.

It is an important fruit which is capable of much expansion and improvement in the warm, temperate and sub-tropical regions of India, and it is surprising, with so many European planters in such localities, that more is not made of the orange. In this province the districts of Hassan, Shimoga and Kadur, must afford favorable sites for cultivation, also the sheltered valleys of the Baba Budan hills. The several uses of this long-keeping fruit, of which there are many varieties, are fully explained in the works referred to at the head of these remarks.

Cultivation.—Seedlings are easily raised from pips, but to obtain a shapely tree, capable of bearing good

crops of fruit, the species should be budded, grafted, or inarched on to the sweet-lime or citron stocks.

Plant healthy grafts, at 25 feet apart, in alluvial or loamy soil in a sheltered situation. The young trees require to be watered at intervals during the first dry season.

120 Citrus decumana, LINN. *Kan.* Sakote, Sakotti, Chakotre, Sakotra.

Fig.—*Bot. Plates Lal-Bagh Collection.*

References.—*Bonavia's Or. and Lem. of Ind. and Cey.; Dict. of Econ. Prod. of Ind.*

The pumelo tree of Indian gardens and the shaddock (after Captain Shaddock) of the West Indies. Introduced to the above named countries from the Malay Archipelago, or Java. Dr. Watt explains that "the word pumelo is a contraction of *pomum melo*, the melon apple." The fruit is also known by the names pompelmos, paradise apple, and forbidden fruit.

A small evergreen, globular, tree, commonly cultivated in fruit gardens and occasionally for scenic effect. It is a pleasing object at all times but especially when laden with its splendid fruit the size of a cannon ball, or larger, according to variety. Like the orange, this species yields three crops of fruit yearly and may be said, practically, to be in flower or fruit all the year round; and like orange-blossom the flowers produce a pleasing fragrance in the vicinity of their growth. Bonavia has clearly brought to notice that the thin skinned pumelos of the Bombay market, having a juicy pulp the colour of raw beef, are preferable to any other variety in Indian cultivation. Being so attractive and useful, this tree should take a prominent place in our garden and pleasure grounds.

Cultivation.—Coming from a warm habitat, it succeeds on the plains, where the orange tree fails.

Seedlings grow into fine shapely trees but the operations of budding and grafting will no doubt improve the quality of fruit. Irrigable land should be chosen for a plantation, as the trees are apt to suffer from long periods of drought. They also require lots of manure during the rainy season. Plant seedlings or grafts in large pits, at 25 to 30 feet apart.

121 Feronia Elephantum, CORREA. *Kan.* Bel, Belada, Belal.

Fig.—*Wight Ic. t. 15. Bot. Plates Lal-Bagh Collection.*

References.—*Brandis For. Fl.*; *Dict. of Econ. Prod. of Ind.*

The elephant or wood-apple tree. Wild and cultivated in all the drier parts of the province.

A deciduous tree of medium size, armed with strong spines.

Well known for its fruit which is an article of universal consumption, the acid pulp being eaten raw and, more rarely, in the form of jelly.

Wood yellowish, close-grained, hard and durable; weighs 50 lb. per cubic foot. Used for house-building and for agricultural implements. The bark yields a white transparent gum which forms part of the East Indian gum Arabic of commerce.

Cultivation.—Raise from seed and plant in any ordinary soil at 20 feet apart. If planted during the early rains the seedlings will require little more attention.

122 Ægle Marmelos, CORREA. *Kan.* Bilpatre, Bilvapatre, Bilpatri.

Fig.—*Wight Ic. t. 16. Bedd. Fl. Sylv. t. 161.*

References.—*Pharm. Ind.*; *Dict. of Econ. Prod. of Ind.*

The bael-fruit tree. Commonly met with throughout the province, and held in the highest

esteem for its medicinal properties, in which the root, bark, leaves and fruit, all contribute a part. The pulp of the fruit is of special value in the treatment of dysentery and diarrhœa, while the hardened shell (rind) is locally made into snuff-boxes. The tender fruit is pickled with *Nimbe.*

Wood strongly scented when felled, yellowish-white, hard, and durable. Weight about 50 lb. per cubic foot. Being a sacred tree, it is seldom felled, although Lovery states that the wood is used in Shimoga for carts and agricultural implements. Its propagation is considered meritorious, and the leaves of the tree are generally presented at the shrine of *Siva.*

Cultivation.—As recommended for the wood-apple tree, but requiring richer soil.

XVII. SIMARUBEÆ.

123 Ailantus excelsa, Roxb. *Kan.* Dodda mara.

Fig.—*Wight Ill. t. 67.*

References.—*Brand. For. Fl. p. 58; Dict. of Econ. Prod. of Ind.*

There are several specimens of this fine tree at Closepet, where it flowers and fruits annually. Deciduous in January or February. Leaves abruptly pinnate, 2—3 feet in length; the glandular-hairy leaflets are coarsely toothed.

Flowers in axillary panicles on longish pedicels, pale yellow.

Samara (fruit) 2½ in., one-seeded, often twisted at the base and blunt or pointed at the apex. Copper-coloured when attaining maturity. A fine tree for ornamental effect.

A moderately large tree of the dry zone. Often confined to the smaller rocky hills. Bark papyraceous, whitish, curling off in thin scales. Leaflets sessile, pubescent, serrate or crenate. Flowers small, white, in axillary racemes, shorter than the pinnate leaves. Wood of little value; but the bastard olibanum or gum-resin which exudes from the trunk possesses a local utility in medicine and worship. It is not, however, so useful in either respect as the true "Sambrani," which is obtained from the following variety of the species.

129 **Boswellia serrata var. glabra.** *Kan*, Sambrani, Chilkada, Chilku, Chittumbe.

Fig.—*Bedd, Fl. Sylv. t. 124.*

References.—*Dict. of Econ. Prod. of Ind.; Pharm. Ind.*

Common on stony land near Closepet and at Nundydroog. Cultivated in gardens at Nanjangud and elsewhere in the vicinity of temples. A small deciduous tree, with smooth leaves and white scaly bark. Wood inferior, and only used for fuel or charcoal. The gum-resin is a bastard olibanum which is extensively used in medicine and as a sweet incense during temple ritual. "Royle describes picking tears off the trees, and states that these burn rapidly with a bright light, diffusing a pleasant odour." *Watt.* The resinous limbs of the tree make capital torches. Although good in itself, this gum-resin, should not be confounded with the true olibanum of commerce.

Cultivation.—When the fruit has attained maturity it should contain three seeds. But the latter are usually abortive and very rarely germinate. On this account the cultivated trees in Mysore are mostly raised from offsets and cuttings. The species thrives best among rocky boulders where there is shelter, warmth, and moisture.

130 Garuga pinnata, Roxb. *Kan.* Hala. Balage, Goddana.

Fig.—*Bedd. Fl. Sylv. t. 118.*

References.—*Brand. For. Fl. p. 62. Fl. of Brit. Ind.*; *Dict. of Econ. Prod. of Ind.*

A large tree of the dry and mixed zones. Leaves large pinnate, deciduous in the cold season. Flowers appearing with the young leaves in March, or a few days in advance of the leaves. Fruit ripening in July, the size of a large gooseberry said to be pickled in some parts for eventual use as a stomachic and cooling remedy. This does not appear to be done in Mysore. The tender leaves are browsed upon by cattle. Wood of no special merit, but frequently cut for fuel. Weight about 40 lb. per cubic foot. The bark affords tannic acid. Easily raised from seed and requiring no pampered treatment in cultivation.

131 Balsamodendron Mukul, Hook.

132 B. Berryi, Ait.

These small spinous trees, or shrubs, form good live-fences and are frequently employed as such in various parts of India. The gum resin of *B. Mukul*, is sold in bazaars as " Indian Bdellium."

133 Protium caudatum, W. & A. *Kan.* Betta mavu. *Tel.* Konda mamadi, also by the vernacular names *Jumminu* and *Jummana*.

Fig.—*Bedd. Fl. Sylv. t. 125.*

Reference.—*Fl. of Brit. Ind.*

A small tree with green bark. Common throughout the maidan and ascending the lower hills. Occasionally seen at the roadsides. Leaves alternate, deciduous, 3—7 foliolate. Fruit the size of a large pea. Wood inferior, but occasionally employed for farm implements. It is stated that native actors utilise the heartwood for making crowns &c.

In the last edition of "Forest Trees" *Konda mamadi* is said to be an unarmed tree, while *Jumminu* is armed. It is possible, therefore, that these vernacular names apply to different species.

Protium caudatum var. Roxburghiana, differs from the specific form in the leaflets being abruptly pointed but not acuminate.

134 Protium pubescens, W. & A.

A tree of the Western Ghâts. All the species of this genus grow readily from cuttings.

135 Bursera serrata, COLEBR.

Fig.—*Bot. Plates Lal-Bagh Collection.*

Reference.—*Brand. For. Fl. p. 61.*

An evergreen tree cultivated in the Lal-Bagh. Perhaps not indigenous to the forests of Mysore. The wood weighs 46 lb. per cubic foot and is said to be good for furniture. Growth very slow at Bangalore,

136 Canarium strictum, ROXB. *Kan.* Manda-dhup, Mund-doopa, Harlmuddy, Raldhupada, Halmaddi.

Fig.—*Bedd. Fl. Sylv. t.* 128.

References.—*Dict. of Econ. Prod. of Ind.; Pharm. Ind.; Gamb. Man. Timb.*

The black dammar tree. So called on account of the brilliant resin which exudes from the charred trunk. A lofty tree of the Malnad and Western Ghâts. Beddome remarks that "its brilliant crimson foliage makes it a most beautiful sight when in young leaf." For coffee, "it affords a nice light and very lofty shade, is a rapid grower (in newly opened land) and is generally left." *Graham Anderson.*

"A tall tree with straight cylindrical stem. Wood shining white when fresh cut, turning grey on exposure, soft, even-grained, does not warp, but decays rapidly. The wood is much esteemed

in Bengal for tea boxes and it is also used for shingles. The tree yields a resin which is used as incense; it is clear, amber-colored and brittle." *Gamble.*

Cultivation.—Seedlings grow rapidly in newly opened forest soil but are slow of growth in the interior where the land has become hard and root-bound. The species attains its largest dimensions on the western slopes of the Malabar range. Healthy saplings have much larger leaves than the full grown tree. Cultivation on the eastern plains is hopeless.

137 Filicium decipiens, THWAITES.

Fig.—*Bot. Plates Lal-Bagh Collection.*

A pretty evergreen tree, cultivated in the Botanical Gardens, and locally employed for avenue and scenic planting. It is indigenous to Ceylon and the Western Ghâts. When polished, the red heartwood is very beautiful. Gamble asserts that the wood is strong and valuable for building.

Cultivation.—Can be raised plentifully from seed. Plant seedlings at 30 feet apart in deep loam or virgin forest soil. In the open, the tree always assumes a pleasing globular form. Height 35—40 feet.

XX. MELIACEÆ.

138 Melia Azadirachta, LINN. *Kan.* Bevu, Olle bevu, Visa bevu.

Fig.—*Bot. Plates Lal-Bagh Collection. Bedd. Fl. Sylv. t. 14.*

References.—*Brand. For. Fl. p. 68. Gamb. Man. Timb.; Dict. of Econ. Prod. of Ind.*

The neem or margosa tree. This beautiful evergreen tree is mostly confined to the maidan tracts where it forms avenues along the public roads and

presents refreshing topes about the villages. But it attains its maximum utility and beauty at lower elevations than Mysore and in localities nearer to the sea. It is held sacred by the Hindus, and is specially dedicated to *Mari*, the goddess of destruction. Medicinal properties are attributed to every part of the plant; and the heartwood is extensively used in the manufacture of idols.

Owing to its bitter properties the wood is not attacked by insects, and being hard, durable, and beautifully mottled it answers well for cabinet work and carpentry.

Neem oil, a product of the seed, is a well-known antidote for destroying borers and other insects which usually attack living plants. Brandis enumerates the economic properties of the species as follows:—

"From incisions in the trunk, near the base, made in spring, issues a quantity of sap, often flowing for weeks; used as a stomachic and cooling drink. A gum used as a stimulant, exudes from the bark. From the fruit is extracted, by boiling or pressure, a fixed acrid bitter oil, (Margosa) deep yellow, with a strong disagreeable flavour. It is used medicinally; in dyeing; as an antiseptic and anthelmintic, and is burnt in lamps. It is said to be expressed from the pulp and not from the seed.

It is exported from Madras, chiefly to Ceylon. The seeds are employed to kill insects, and for washing the hair.

The leaves are bitter and are used medicinally; bark is very bitter and is used as a substitute for Peruvian bark."

Possessing so many useful properties, the neem is deservedly one of the best known and most popular trees of the country. In the native treatment of small-pox, the green leaves are invariably used to place under and around the patient at certain stages

of the disease. As the tree is supposed to possess powerful antiseptic properties it is much planted in towns, especially throughout the plains of the Madras Presidency. It flowers in February or March, and ripens its fruit in June or July.

Cultivation.—Of seeds sown, not more than 40 per cent, may be expected to germinate. Healthy trees are often found in the back-yards of native houses associated with the *Ficus religiosa,* another sacred species. These are planted in the same pit together so that their limbs and branches may entwine and form what is called a natural marriage. For avenue or tope planting the trees should be 45 feet apart. In inland situations, an occasional top dressing of sheep or goats manure, with a few handfuls of salt will make the saplings grow rapidly. The neem coppices well.

139 Melia Azedarach, LINN. *Kan.* Hutchu bevu, Chik bevu, Issapuri, Arebevu ?

Fig.—*Bot. Plates Lal-Bagh Collection. Bedd. Fl. Sylv. t. 13. Wight Ic. t. 160.*

References.—*Brand. For. Fl. 68. Dict. of Econ. Prod. of Ind.*

The Persian lilac or bead tree. Much cultivated in towns and villages on the plains, but not truly indigenous to any part of Southern India. When conserved in private or public grounds it is a pleasing evergreen tree with sweet-scented lilac flowers, but seen in the villages it is always an unsightly and much abused object, owing to its being ruthlessly stripped of its leaves to provide forage for sheep and goats. The wood is worthless, although it is nicely mottled and takes a good polish. Weight about 35 lb. per cubic foot. Although not so popular as the true neem, for which it is occasionally mistaken by Europeans, it really possesses, in a minor degree, many of the same useful properties as that tree. The kernels of the fruit (seeds) are

universally worn as rosaries, hence the appellation "bead tree." As a forage tree its cultivation should be encouraged, but not on the lines which are now followed, whereby every villager takes upon him to disfigure and even kill trees through excessive manipulation.

Cultivation.—As for the neem, but may be planted at 25—30 feet apart.

140 Melia dubia, Cav. *Kan.* Heb bevu, Turka bevu, Bettada bevu, Kadu bevu.

Fig.—*Bedd. Fl. Sylv. t. 12.*

References.—*Brand. For. Fl. t. 69. Dict. of Econ. Prod. of Ind.*

This is the giant neem of the Malnad forests. It attains a very large size and can easily be distinguished from the neem of the plains by its darker foliage and doubly pinnate leaves. It is said to be deciduous also.

Although light and not very durable, weighing about 25 lb. per cubic foot, the wood is generally employed on estates for buildings and agricultural implements. It is rarely attacked by insects and has been recommended for tea cases. The dried fruit resembles the date and has a commercial value of Rs. 1-4-0 per lb. It is used medicinally, and is considered a good remedy for colic, half a fruit being the usual dose for an adult. Being a very handsome tree with greenish-white, fragrant, flowers, its cultivation in gardens situated among, and near to the hills, is a thing to be desired. Beddome writes that the seedlings grow rapidly. It is the *M. composita* of Willd.

141 Cipadessa fruticosa, Blume. *Kan.* Chittundi.

A common shrub of the scrub tracts. Used as small fuel. Berries red, the size of a pea.

142 Aglaia Roxburghiana, Miq. *Kan.* Tottila. Fruit—Tittila kayi.

Fig.—*Wight Ic. t. 166 ; Bedd. Fl. Sylv. t. 130.*

Reference.—*Pharm. Ind.*

This fine tree should be searched for on the Baba Budan hills.

Leaves pinnate. Flowers yellow. Fruit the size of a gooseberry, buff-colored to brown, eaten medicinally.

143 Amoora Rohituka, W. & A. *Kan.* Mulla muttala.

Fig.—*Bedd. Fl. Sylv. t. 132.*

References.—*Dict. of Econ. Prod. of Ind. ; Pharm. Ind. ; Brand. For. Fl. 69.*

An evergreen tree of the Western Ghâts. Leaves large, pinnate, 2—3 feet. Flowers small, in spicate or branched panicles according to sex. Fruit dull red, the size of a crab apple. "Graham likens the fruit to a ball of Windsor soap." The bark is astringent, and the seeds furnish an economic oil.

144 Amoora Lawii, Benth. A species with smaller leaves and fruit. Should be looked for in the Malnad.

145 Walsura piscidia, Roxb. *Tel.* Walurasi.

Fig.—*Wight Ill. i. t. 55.*

References.—*Dalz. & Gibs. Bomb. Fl. 37 ; Fl. of Brit. Ind.*

A tree of the Western Ghâts. Leaves 3-foliolate. Flowers in terminal panicles, small, numerous, sordid-yellowish. Fruit egg-shaped, the size of a small olive. The bark is used to poison fish. Other properties unknown.

146 Heynea trijuga, Roxb. *Bom.* Limbara.

Fig.—*Bedd. Fl. Sylv. t. 134.*

References.—*Brand. For. Flora ; Dalz. & Gibs. Bomb. Fl. 38.*

An ornamental tree of Coorg and the Western Ghâts. Leaves imparipinnate, with usually 9 large leaflets. Panicles axillary and terminal, corymbose, long-peduncled, nearly equalling the leaf. Flowers small, white. Fruit the size and colour of a small cherry. Herbarium specimens are required, as also fuller information as to the character and utility of this species.

147 Soymida febrifuga, Adr. Juss. *Kan.* Swami mara, Kal gurige ?

Fig.—*Bedd. Fl. Sylv. t. 8.*

References.—*Brand. For. Flora 71 ; Pharm. Ind.*

The bastard red-cedar of Europeans. A lofty tree of the Malnad and isolated hills ; found in the reserved jungles at Closepet. As this species is often confounded with *Cedrela Toona,* the so-called white cedar, the annexed characteristics may assist enquirers to determine between the two trees.

Soymida febrifuga. Red Cedar.	Cedrela Toona. White Cedar.
Leaves paripinnate, nearly evergreen, 12 to 20 inches.	*Leaves* pinnate, deciduous, 1 to 3 feet.
Stamens united into a cup-shaped tube.	*Stamens* distinct, 4—6, or with alternating staminodes.
Ovary 5-celled, with numerous ovules in each cell. Seeds slightly winged at both ends.	*Ovary* 5-celled with 10—12 ovules in each cell. Seeds winged at one or both ends.
Capsule large.	*Capsule* small.

Although unreserved, this tree affords one of the very best timbers. It is the principal red-wood of English denizens and is known to be hard, dull-red and very strong. Weight when seasoned, 70 to 75 lb. per cubic foot. Indeed Swami mara is reckoned by the Hindus to be the most durable of woods and is preferably used on that account in the building of

temples. It is also durable under ground and is said to resist the attacks of white ants. The liber, or inner bark, is exceedingly bitter and its astringent and febrifuge properties induced Roxburgh to recommend it as a substitute for the Peruvian bark. Although locally used for building and in native medicine, the species has, as yet, no commercial value. Whether this is due to its scarcity or to ignorance of its useful qualities, is unknown. Being rich in tannic acid, the bark should soon take a foremost place among commercial tans.

Easily raised from seed but otherwise the cultivation is unknown. The species is said to be extremely prejudicial to coffee cultivation.

148 Chickrassia tabularis, ADR. JUSS. *Kan.* Dal mara, Gavuda ?

Fig.—*Bedd. Fl. Sylv. t. 9. Wight Ill. i. t. 56.*

References.—*Brand. For. Fl. 66. Gamb. Man. Timb. 76. Dict. of Econ. Prod. of Ind.*

A tall evergreen tree of the Malnad and Coorg. Yields a superior timber which is extensively used in Madras, Bengal and parts of Burmah, as "Chittagong wood." This product possesses nearly all the qualities necessary for first-class cabinet-work, being beautifully marked, durable, fragrant, easily worked and susceptible of a fine glossy polish. Weight 40 to 52 lb. per cubic foot. Bark highly astringent but not bitter. The flowers afford dyes of red and yellow colours. A specimen tree may be seen in the Botanical Gardens, where it grows rather slowly but with a straight trunk.

Cultivation.—Seedlings are easily raised, but subsequent growth is not very rapid unless the soil is loose and rich. In a situation where these conditions are afforded, the Chittagong-wood tree would form splendid avenues.

149 Cedrela Toona, Roxb. *Kan.* Gandagarige, Nandurike ? Kandagarige. *Coorg.* Noge, Nogga, Belandi.

Fig.—*Bedd. Fl. Sylv. t. 10. Wight Ic. t. 161.*

References.—*Brand. For. Fl. 72. Dict. of Econ. Prod. of Ind.*

A moderately large tree of the Malnad and Coorg. Leaves pinnate, large, deciduous in the cold weather. Cultivated in the Botanical Gardens and in the exotic plantation at Hebbal. Generally known as the white cedar, although the seasoned wood resembles pale mahogany in colour. There is an export trade in white cedar from Burmah, where the timber is commercially known as "Moulmein cedar." In Bengal and parts of Assam, it is in great demand for buildings and furniture, for which it is considered durable. It is also said to be exempted from the attacks of white ants. Weight 30 to 36 lb. per cubic foot. *Chickrassia tabularis* is occasionally known to the timber trade as 'white cedar', and as regards the colour of its wood more correctly so. But the latter is a lofty evergreen tree with a beautiful straight trunk. Technically separated from *Cedrela* by its staminal tube, and three celled ovary.

"The Nogga gets its local name from being the favourite tree for making bullock yokes from.

The shade (for coffee) is light and sufficient, while propagation is extremely easy from seed.

Millions of young plants have been grown within the last few years by nearly every planter in Mysore and Coorg. The timber is easily worked and fairly durable for roofing purposes, but will not stand exposure or being buried in the soil as posts, bed-plates &c. It is agreeably fragrant and of a dark red colour." *Graham Anderson.*

Cattle browse on the green leaves and fruit when

they have a chance. Red and yellow dyes, called *Gulnari*, are afforded by the honey-scented flowers. The bark is medicinal.

Cultivation.—It will be seen from Mr. Graham Anderson's remarks that there is no difficulty in propagating this useful tree. It grows fairly well on the maidan also, although a little stunted in size. Plant in deep soil at 30 feet apart.

Cedrela serrata, Royle. is looked upon by Indian authors as a distinct species, but Hiern, in the Flora of British India, includes it as a form of *C. Toona*.

It is well described by Brandis in his excellent Forest Flora. The West Indian cedar, *Cedrela odorata*, has recently been introduced and is being established in the Lal-Bagh. This species is said to furnish timber of exceptional quality.

150 Chloroxylon swietenia, DC. *Kan.* Huragalu, Masi, Mashudla.

Fig.—*Bedd. Fl. Sylv. t. 11.*

References.—*Gamb. Man. Timb.*; *Brand. For. Fl.*; *Dict. of Econ. Prod. of Ind.*

The Indian satin-wood tree. A moderate-sized deciduous tree ; usually very small in the maidan but attaining a larger size towards the hills. Leaflets small, in 10—15 pairs, pale green. Wood hard, yellow-mottled and prettily veined, dark towards the centre ; possesses a fine satiny lustre and is admirably adapted for the most delicate pieces of cabinet work, carpentry and turnery. Weight 56 lb. per cubic foot.

"Heartwood somewhat black, heavy, and not easily burnt, so that when a log catches fire the outer layer only will be burned. It is used for beams, posts, sugar-cane crushes, boats, planks and charcoal." *M. Venkatnarnappa.*

But in addition to these local uses satin wood is

widely utilised for agricultural and engineering work in various parts of India, one of its chief merits being durability under water. It thus possesses the remarkable dual property of resisting both fire and water! It turns well and is employed in Europe for making the backs of brushes, stethescopes and fancy articles.

Cultivation.—In the maidan, growth is exceedingly slow, and as seeds collected at Kankanhalli and elsewhere never germinate, the species is not propagated. Seeds from the Malnad should be sown.

151 Swietenia Mahagoni, Linn.

Fig.—*Hook. Bot. Miscell. i. t. 16, 17.*

Reference.—*Brand. For. Fl.*

This important timber tree, indigenous to Central America and the West Indies, is cultivated in the Lal-Bagh, and during the past four years about 2,000 seedlings have been established in the Government exotic plantation at Hebbal.

The largest of these are now twelve feet high and promise to yield good timber. The large leaved mahogany, *Swietenia macrophylla*, is also successfully cultivated in the Botanical Gardens.

XXI. OLACINEÆ.

152 Ximenia americana, Willd. *Kan.* Nagare.

A woody shrub of the maidan tracts. Flowers small, white, and fragrant. "The fruit is edible and the wood is used as a substitute for sandalwood." *Flora of Brit. Ind.*

153 Olax scandens, Roxb. *Tel.* Turka-vepa, Bapanamushti.

References.—*Fl. of Brit. Ind.; Dict. of Econ. Prod. of Ind.*

A vigorous evergreen climber with a trunk the

thickness of a man's thigh. Destructive to young trees, which it rapidly invests and subsequently smothers by its far reaching shoots.

XXII. CELASTRINEÆ.

154 **Gymnosporia montana,** ROXB. *Kan.* Tandrasi.

Fig.—*Wight Ic. 382. Bedd. Fl. Sylv. Anal. Gen.*

References.—*Brand. For. Fl. 81. Dict. of Econ. Prod. of Ind.*

This prickly bush is exceedingly common in the scrub tracts of the Bangalore District, where it sometimes spreads to the exclusion of every other shrub. On the Bombay side the branches are employed as dunnage for the roofs of houses. When softened by beating, the leaves become useful as a green food for cattle.

155 **Celastrus paniculata,** WILLD. *Kan.* Kangondi, Kariganne.

Fig.—*Wight Ill. 179; Wight Ic. t. 158.*

References.—*Brand. For. Fl. 82. Dict. of Econ. Prod. of Ind.*

A scandent shrub of the low hills and scrub tracts. Useful medicinal properties are attributed to the seed and oil, both of which are marketable articles in the bazaars.

156 **Elæodendron giaucum,** PERS. *Kan.* Mukarive.

Fig.—*Wight Ill. 178, t. 71. Bedd. Fl. Sylv. Anal. Gen. 67.*

A small evergreen tree of the plains. The leaves, bark and roots, possess medicinal properties and are said to be astringent. The root is considered an antidote for snake-bite. Wood moderately hard and durable, used for cabinet work, combs and

picture frames. Weight 40 to 50 lb. per cubic foot, but always small.

XXIII. RHAMNEÆ.

157 **Ventilago madraspatana,** Gærtn. *Kan.* Popli.

Fig.—*Wight Ic. 163.*

References.—*Brand. For. Fl. 96. Pharm. Ind.*

A large scandent shrub of East Mysore, where it reaches to the top of the highest trees. The root-bark (Vembadam bark) affords a well known dye of an orange-red colour; and constitutes an important minor product of the State forests. It also yields a fibre of some repute. The local market value of Popli bark is Rs. 1-12-0 to Rs. 2 per maund of 25 lbs. The cultivation of this product should be encouraged in the maidan districts of Mysore, where it thrives well and requires hardly any care-taking. The plant is propagated from seed.

158 **Zizyphus Jujuba,** Lamk. *Kan.* Yelachi, Yelchi.

Fig.—*Wight Ic. t. 99. Bedd. Fl. Sylv. 149.*

References.—*Dict. of Econ. Prod. of Ind.; Brand. For. Fl. 86.*

The Bhere-fruit tree. Armed, spreading, 30—50 feet. Leaves deciduous in the cold weather; young parts covered with a dense fuscous tomentum. "There are many cultivated varieties, differing greatly in the size and shape of the leaves, as also in the size and nature of the fruit, of which the most remarkable is Edgeworth's var. *Hysudricus*, with erect or spreading not drooping branches, obtuse, ovate, oblong or orbicular leaves, glabrous or slightly tomentose beneath, and long petioles. This, according to Aitchison, is always raised by grafts." *M. A. Lawson in Fl. of Brit. Ind.*

This tree is often cultivated for its fruit, of which the best varieties are found in Northern India.

Wood hard, even-grained, tough and durable, weighing 57—58 lb. per cubic foot.

Used in the Ordnance Department at Madras and said to be good for saddle-trees, camp furniture, agricultural and engineering implements; also for fuel and charcoal.

The bark is very astringent, and a medicinal gum exudes from it.

Cultivation.—Easily raised from seed, and a good coppice tree. A few of the varieties yielding fruit of superior size and quality are habitually grafted in the north. This should be done in the south also, when better fruit than now exists may be looked for.

Plant grafts or seedlings in tolerably rich land at 30 feet apart. Ripe fruit is attacked at an early stage by maggots. The tree is unsuited for roadside planting.

159 **Zizyphus nummularia,** W. & A. *Kan.* Purpalli, Parpuli.

Fig.—*Bedd. Fl. Sylv. Anal. Gen.* LXIX.

A scandent, prickly, shrub, usually found in scrub tracts and in the fences around villages. When properly trimmed, it forms an excellent live-fence for the protection of property. The fruit has a pleasant acid or subacid taste and is eaten by children. Sheep and goats browse upon the tender shoots.

160 **Zizyphus xylopyrus,** WILLD. *Kan.* Challe.

Fig.—*Bedd. Fl. Sylv. Anal. Gen.* LXVIII.

Rarely a small tree, but most commonly seen as a climbing shrub. All the salient parts are larger than in the foregoing species, and we have no record that the fruit is serviceable except as a dye for

blackening leather. Wood hard, tough; weighing about 60 lb. per cubic foot. Used for walking sticks and torches. Growing at Nundydroog.

161 Zizyphus rugosa, LAMK. A Malnad species having white pear-shaped fruit which is said to be eaten. This is also an extensive woody climber or small tree. Evergreen.

162 Scutia indica, BRONGN. *Kan.* Kurudi.

Fig.—*Wight Ic. t. 1071. Wight Ill. i. t. 73.*

A climbing shrub of the plains. Branches straggling, armed or not with recurved prickles. Leaves opposite or subopposite, roundish or obovate; average blade $1\frac{1}{2} \times 1$ in. Fruit the size of a pea, red to black in colour. The whole bush has a smooth or polished appearance.

The fruit is eaten by all classes and is usually sold in the bazaars during harvest time. Easily raised from seed.

XXIV. AMPELIDEÆ.

163 Vitis vinifera, LINN. *Kan.* Drakshi.

Fig.—*Bot. Plates Lal-Bagh Collection.*

The grape vine. Cultivated in gardens for its luscious fruit. Remarkable for its longevity and hardihood in warm temperate and subtropical climates. Under skilful treatment, the grape vine would be productive of superior fruit in the maidan portion of Mysore, and might afford, if introduced in greater variety, the conditions suitable for the preparation of wine; the various wines of commerce being the prepared juices of the grape. Indian grapes are sold at 2—4 annas per lb. but specially grown for dessert they would often command double the prevailing rates. As a remunerative garden industry the cultivation of vines is confidently recommended.

A few other species of *Vitis* are indigenous to the State forests, where they occasionally form extensive *lianes* and become objects of interest dangling from one tree to another.

XXV. SAPINDACEÆ.

164 **Hemigyrosa deficiens**, BEDD.

A small tree of the Malnad, flowering throughout the year. Uses unknown. Herbarium specimens would be acceptable at head-quarters.

165 **Allophylus Cobbe**, BLUME.

A small tree of the western hill tracts. Leaves trifoliolate. Flowers irregular. Fruit a red berry the size of a red-currant, said to be eaten. Root astringent. Wood grey and soft.

166 **Schleichera trijuga**, WILLD. *Kan.* Sagade, Chakota, Chendala, the latter name mostly in North Coorg. Shargadee?

Fig.—*Bedd. Fl. Sylv. t. 119.*

References.—*Brand. For. Fl.; Dict. of Econ. Prod. of Ind.; Pharm. Ind.*

The Ceylon oak. A handsome tree of the dry forests; flowering and foliating early in the hot season. Leaves deciduous, paripinnate. Flowers small, greenish-yellow. Fruit the size of a damson plum. Should be planted as an avenue tree as the young leaves impart humidity and shelter during the hottest season of the year. Of unreserved timbers, this appears to be one of the very best, being close-grained, durable, and weighing 66 to 70 lb. per cubic foot. In the Central Provinces the lac insect is nourished on the tree, just as it is on *Shorea Talura*, within the territories of Mysore.

"Valued where strength, hardness and durability are required. Oil, rice and sugar crushers, pestles

and mortars, rollers, screws and the teeth of harrows are made of it; it is also used in building, and for various parts of carts and ploughs." *Brandis.*

The bark and oil are medicinal products, the latter being expressed from the seed and not uncommonly used, in some parts of the country, as a lamp-oil. The authors of Pharmacographia Indica are of opinion that it is the original Macassar oil of commerce, and that it is now retailed in Germany under the above name, on which account it is recommended as a desirable application to the scalp, which promotes the growth of hair. Rubbed up with the oil, the astringent bark is used to cure itch, acue, and similar skin affections.

Cultivation.—Seeds germinate fairly well in a moist position. But later in growth, a comparatively dry situation is appreciated between the altitudes of 1,000 and 3,000 feet. It is an effective avenue tree planted at 40 feet apart.

167 **Sapindus trifoliatus**, LINN. *Kan.* Kugati, Antawala, Artala.

Fig.—*Bot. Plates Lal-Bagh Collection. Bedd. Fl. Sylv. t. 154.*

References.—*Pharm. Ind.; Dict. of Econ. Prod. of Ind.; Drury U. Pl.*

The soapnut tree of South India. Of this species there are two distinct forms in Mysore. One with large, acuminate, glabrous leaves, often trifoliolate, and the other having comparatively small pinnate leaves; leaflets stout, emarginate, pubescent underneath. Fruit usually 3-lobed, each lobe being the size of a small cherry. Abundant throughout the maidan, especially in the vicinity of villages, where it attains a medium height. Bare of leaf in March and April; flowering in October and affording ripe fruit in February. Of indigenous trees, this is one of the best known on account of its saponaceous fruit,

which is commonly used by the poorer classes for washing their clothes. Soapnuts have therefore a local market value of Rs. 1—12—0 to Rs. 2 per maund of 25 lbs.

Medicinal properties are attributed to the root, bark, fruit, and oil, the latter being a saponaceous product of the seed.

Wood hard, yellow, cross-grained and not very durable. Occasionally used for building carts, but more commonly as handles to axes and similar tools, it is also used for making combs.

Cultivation.—The *Kugati* is propagated from seed and suckers, the latter being plentifully self-productive in favorable localities. Loam, clay, and black-cotton soils are favorable to growth. Plant sturdy seedlings, or transplant offsets, at 35 to 40 feet apart.

168 **Nephelium Litchi,** CAMB.

An evergreen fruit-tree cultivated in the Lal-Bagh, and in various parts of India. Introduced from South China. Quantities of seedlings are raised from local trees every year.

169 **Nephelium Longana,** CAMB. somewhat similar to the last named but having a smaller and less palatable fruit. The Logan tree is said to be indigenous to the Western Peninsula. It is cultivated in the Botanical Gardens.

170 **Dodonæa viscosa,** LINN. *Kan.* Bandrike, Bandare, Bandri.

Fig.—*Bot. Plates Lal-Bagh Collection. Wight Ill. i. t. 52.*

References.—*Brand. For. Fl. 113; Dict. of Econ. Prod. of Ind.*

This evergreen shrub abounds on the plains of Mysore, and as a fuel plant it is widely consumed by the poorer classes. Being of a resinous nature, it

ignites readily and burns with a bright forcible flame. The large wood is often utilised for making charcoal of superior quality. Buchanan mentions that the presence of "Bandury" indicates a good soil for the cultivation of horse gram. It may be added that it also indicates a suitable soil for all pulse crops requiring a given percentage of lime. In the north of India, the shrub is often employed for hedging. The seasoned wood makes good handles for gardening tools, as also walking sticks. The leaves are used medicinally. Easily propagated from seed.

XXVI. SABIACEÆ.

171 **Meliosma Wightii**, PLANCH.

A small tree of the western boundary. Flowers white and showy. Herbarium specimens are required.

172 **Meliosma Arnottiana**, WIGHT. *Kan.* Massivara? Massiwalla.

Fig.—*Bedd. Fl. Sylv. t. 160.*

A handsome flowering tree in the forests of Hassan, Shimoga, and possibly Kadur. It flowers in June, and ripens it fruit, the size of a pea, four months later. M. Venkatnarnappa says the heartwood is useful for house building, although it is pronounced useless in the last edition of this work.

Lovery describes the tree as of moderate size, yielding poles and agricultural implements. Specimens are required for the herbarium.

XXVII. ANACARDIACEÆ.

173 **Mangifera indica**, LINN. *Kan.* Mavu, Mavena, Shi-mavu, Amba.

Fig.—*Bot. Plates Lal-Bagh Collection: Bedd. Fl. Sylv. 162.*

References.—*Brand. For. Fl. 125. Drury U. Pl.; Dict. of Econ. Prod. of Ind.*

The mango tree. Without exception this is the best known and most highly esteemed fruit tree in Hindustan. Its praises have been sung for more than a thousand years, while kings and princes have vied to do it honour. The mango tree is evergreen, and flowers progressively during the months of January, February and March. The fruiting season (when ripe fruit can be procured) is likewise progressive through the months of May, June and July. The species is easily influenced by various conditions of season, soil, and position; hence the long term usually covered by its reproductive growth in the varying climates of India. There are also numerous varieties of the fruit, but these are often peculiar to certain districts, and are apt to lose their esteemed properties when cultivated in other localities. Grafted mango trees have been profitably cultivated at Bangalore for upwards of 30 years. As compared to the seedling tree they are greatly stunted in growth, assuming the form of huge globular bushes rather than trees, they also come into bearing much sooner and are probably shorter-lived than the seedling tree. Brandis affirms that in Burmah the mango is not generally grafted. Seeds of a distinct variety occasionally produce seedlings of their kind, and, it may be exclusively, in districts where the species is limited to one or two varieties, but where the latter are numerous no reliance can be put in the identity of mango seedlings. The grafted varieties cannot be reproduced from seed, so that grafting or inarching should be resorted to as the quickest and surest method of securing the finest fruit.

In addition to its great value in dessert, the mango is very extensively chatnied, pickled and preserved,

Medicinal properties are attributed to nearly every part of the tree, which is universally cherished by the people of India.

The wood of the seedling mango attains ample dimensions, and being plentiful and easily worked finds its way into minor works of carpentry and engineering; it does not, however, stand exposure, nor is it exempt from the attacks of white ants, wood-lice and other timber pests. Weight about 40 lb. per cubic foot.

Cultivation.—During the fruiting season the ripe mango stones are laid down thickly under partial shade, where they are subsequently covered by a thin layer of sand and left to nature. In the course of a month or six weeks, unless the weather has been abnormally dry, every healthy stone will have sprouted, and in September or October the seedlings should be ready either for potting or transplanting into a nursery plot in the open field. In the latter case, plant in drills at eighteen inches apart each way and cultivate until the young trees are $2\frac{1}{2}$—3 feet in height. With good treatment this growth will be attained in eighteen to twenty months, so that the whole period required to prepare a good mango stock, from seed-sowing to the time of grafting, is under two years. When stocks have attained the proper size in the nursery they are transplanted a second time into position for grafting, which is on to small mounds of earth conveniently placed under the branches of the old grafted tree. In this position they should be left for nearly two months before the actual operation of inarching is put in hand. The latter is now so widely understood, that it calls for no description here, but it should be stated that young trees, specimens showing signs of disease, and very old trees are not in a condition to afford the best scions for inarching. The operation

should be carried out during the months of August and September for preference, but can be undertaken with varying results all the year round. It occupies $3\frac{1}{2}$ to 4 months to effect a proper union between the stock and scion. The local practice of taking grafts from young trees of 8—12 years of age should not be encouraged. Plant at 45 feet apart.

174 Anacardium occidentale, LINN. *Kan*. Jidi, Turuka geru, Kempu geru, Geru poppu.

Fig.—*Bot. Plates Lal-Bagh Collection; Bedd. Fl. Sylv. t. 163.*

References.—*Dict. of Econ. Prod. of Ind.; Pharm. Ind.*

The cashew-nut. A Brazilian tree naturalised in this country by the Portuguese. Extensively cultivated in gardens, and much esteemed for its medicinal properties. By special treatment the kidney-shaped fruit, with its large fleshy torus, affords anacardic acid, oil of almonds, tar, and a weak spirit; roasted without the torus, it is a great delicacy at the dessert table, and is often used in native sweetmeats.

The cashew-apple oil extracted from the shell of the nut, or fruit proper, is a good preventive against the attacks of the white ant. Gum obtained from the bark is also obnoxious to insect pests.

Wood red and moderately durable, but mostly crooked and never very large. Weight 38 lb. per cubic foot.

Cultivation.—This small evergreen tree succeeds well in dry localities, although it is most prolific of fruit when under garden cultivation. Seeds obtained from the jungle trees germinate readily. Experiments in budding and grafting are suggested.

175 Buchanania latifolia, ROXB. *Kan.* Murkali, Murkalu, Nuskul, Murkali morave.

Fig.—*Bedd. Fl. Sylv. t. 165.*

References.—*Brand. For. Fl.; Dict. of Econ. Prod. of Ind.; Pharm. Ind.*

A sub-deciduous tree of the dry forests. Height 30—50 feet. Well known for its edible seeds. The heartwood seasons well and is sufficiently durable for protected work. Weight 36 lb. per cubic foot. Used in parts of India for making boxes, bedsteads, tables, doors and such like. The tender leaves are eaten by sheep and cattle. Oil, gum and tan are useful products of the species, and the kernel of the fruit is a good substitute for the almond. *Murkali* seeds abound in a limpid sweet oil and are more agreeable to the taste than either country almond, cashew-nut or ground-nut.

They are sold in the bazaars at certain seasons, at rates varying from 3 to 6 annas per lb. Used in sweetmeats, It should be observed that the bark affords an excellent tan, which is an article of trade in Travancore. Seeds have failed to germinate under artificial treatment, but it has been noticed that the trees in the Bidadi Taluk are reproduced by means of root-suckers.

Buchanania angustifolia, Roxb. should be found in the hill region. It is an evergreen tree of larger dimensions than *B. latifolia*.

176 **Odina wodier**, ROXB. *Kan.* Udi, Shimti, Punal, Gogal.

Fig.—*Wight Ic. t. 60; Bedd. Fl. Sylv. t. 123.*

References.—*Dict. of Econ. Prod. of Ind.; Fl. of Brit. Ind.; Pharm. Ind.*

A deciduous tree of the plains. Local specimens line the public road passing between Cubbon Pettah and the Division Cutcherry. It is a gnarled ugly tree remaining bare of leaf until near the close of the hot season. Wood very subject to the attacks of insects and generally of little value; heartwood dull red. Weight 50—60 lb. per cubic

foot. Medicinal properties are attributed to the bark and gum. Cattle feed voraciously on the green leaves, but the latter appear at a time when green forage is usually abundant. Every part of the tree abounds in starch, and hence the facility for propagation by cuttings. But raised by the latter method, the tree soon assumes a contorted habit of growth which renders it very ugly, especially in the deciduous stage.

Local trees have not fruited, although they flower annually and are in many cases past maturity. It is not known, therefore, if seedlings would produce shapely trees as they do in the case of "Huvarasi mara," *Thespesia populnea.*

177 Semecarpus Anacardium, LINN. *Kan.* Geru, Kari geru.

Fig.—*Wight Ic. t. 558 ; Bedd. Fl. Sylv. t. 166.*

References.—*Dict. of Econ. Prod. of Ind.; Pharm. Ind.; Flora of Brit, Ind.*

The marking-nut tree. Common in the dry forests of Mysore, where it attains a height of 40—50 feet. Leaves deciduous in the beginning of the hot season, simple, coriacious, average blade 20 × 8 in., largest in healthy saplings. Drupe the size of a prune. Wood of little value as it cracks in seasoning. Weight 42 lb. per cubic foot. When growing, it is full of an acrid juice which causes irritation and swelling. Woodmen do not care, on that account, to fell the trees unless they have been previously ringed.

The fleshy receptacle on which the fruit is seated (hypocarp) is generally eaten by the people. The pericarp, or fruit proper, contains an intensely acrid juice which is much employed in native medicine; it also affords a black varnish, and mixed with lime water, the juice is popularly used for marking linen.

Although of comparatively little value as a timber

tree, the *geru mara* is widely known and appreciated for its medicinal fruit. M. Venkatnarnappa states that the oil from the seed is utilised in the taming of wild elephants and that a birdlime is prepared from the crushed, green fruit. When ripe, the latter is very pretty, the shining black drupe being in distinct contrast to the orange-red receptacle.

Cultivation.—Although the seeds of this tree germinate freely, the seedlings (according to local experience) invariably damp off at a tender age. This retards propagation so much that the species is not found in garden cultivation. Experiments should be made in grafting, inarching and putting down cuttings.

178 Semecarpus Anacardium var. cuneifolia, DC.
Kan. Goddu geru.

This is a larger form, which is said, as the vernacular implies, to be barren of flowers and fruit. The species, *S. travancorica,* and *S. auriculata,* should be searched for in the western Malnad. One is figured and both are described in "Beddome's Flora Sylvatica."

179 Holigarna Arnottiana, Hook.

Fig.—*Bedd. Fl. Sylv. t. 167.*

A lofty tree of Coorg and the Western Ghâts. All the species of this genus possess a peculiar acrid juice of a dark color. Herbarium specimens are much wanted.

180 Holigarna ferruginea, Marchand.

Resembling the last named, excepting that the short, robust, racemes have larger flowers. The tree is also less branched, while the herbacious parts are rather thickly covered by a reddish tomentum.

181 Holigarna longifolia, Roxb. *Kan.* Kutugeri, Kooteegheree.

References.—*Gamb. Man. Timb.; Fl. of Brit. Ind.*

A tall tree with whitish bark and long narrow leaves which are not drooping. Not uncommon on the borders of the Gháts, and occasionally on coffee estates and in the interior of the evergreen belt. The small clustered flowers are produced in ample panicles, which are finely pubescent. Drupe round, hard, and said by Mr. Graham Anderson to be eaten by the Toddy-cat.

"A large tree of the Western Gháts. Wood grey, with yellowish streaks, soft. It, like all the other species, gives a black acrid exudation which raises blisters and is much dreaded by the hill people." *Gamble.*

182 Spondias mangifera, WILLD. *Kan* Amate. (*Hind.* Amra,) Pundi.

Fig.—*Bedd. Fl. Sylv. t. 169.*

References.—*Dict. of Econ. Prod. of Ind.; Pharm. Ind.*

The hog-plum of Europeans, and the *Adhvagabhogya* of Sanskrit writers. A small, or, under the most favourable conditions, medium sized tree. Wild, and cultivated at intervals throughout the maidan. Leaves deciduous during the cold season, perfectly glabrous, odd-pinnate. Flowers small, creamy-white, in large panicles preceding the young leaves in March. Fruit like a miniature mango, ripens in May and June, makes a fine pickle in the half grown stage. Wood soft, light-grey and of little value except as fuel. A gum exudes from the trunk, which, with the fruit and bark, is used medicinally.

Cultivation.—The *Amate* possesses more than one property which makes it worthy of cultivation. It is easily produced from seed, and treated with special care, in good garden soil it is very productive of fruit. Plant seedlings at 20 feet apart. If near a water channel or perennial stream of water, the result will be satisfactory.

183 Spondias acuminata, Roxb.

Nothing is definitely known of this species, which is described in the Flora of British India as "an elegant middling sized tree apparently differing from *S. mangifera* chiefly in the smaller leaves with longer points, the very short panicle and smooth stone." The tree should be searched for in the hill forests.

184 Schinus Molle, Linn.

Fig.—*Bot. Plates Lal-Bagh Collection.*

The bastard pepper tree. Introduced from Brazil and cultivated for ornament in the cities of Bangalore and Mysore. A small evergreen tree of weeping habit. Often mistaken for a weeping-willow tree to which it bears some resemblance, except in colour. But exclusive of distant effect, there is really no resemblance between the two species, which belong to widely separated families. Leaves glaucous. For planting on lawns, behind tombstones and on the banks of garden ponds or streams, we have nothing to surpass the graceful habit of this tree. It grows rapidly in any loose soil of rich or moderately rich quality, but does not retain its beauty so long as the willow. It is a resinous tree.

XXVIII. MORINGEÆ.

185 Moringa pterygosperma, Gærtn. *Kan.* Nugge.

Fig.—*Bot. Plates Lal-Bagh Collection; Bedd. Fl. Sylv. t. 80.*

References.—*Dict. of Econ. Prod. of Ind.; Brand. For. Fl. 129; Pharm. Ind.*

A small soft-wooded tree, plentifully found in backyards, village enclosures and cultivated garden land all over the country. To English denizens it is familiar under the appellations "drumstick" and "horseradish tree." Medicinal properties are attributed to nearly every part of the plant, while the flowers,

fruit and roots are extensively eaten. In February and March the tree is profusely covered by its creamy-white blossom, and is a refreshing object at that season. The fleshy roots are an excellent substitute for horse radish. Oil of Ben is expressed from the seed, but in India the latter is seldom allowed to mature, hence there is no local trade in this valued product. It is a neglected industry which Dr. Watt brings forcibly to notice in the following words :—

" The oil from this species and that from *M. aptera*, Juss. are commercially termed Ben oil and are highly valued as lubricants by watch-makers.

It is, however, seldom made in India and does not form an article of export, a fact which is the more remarkable when one remembers the great extent to which the tree is cultivated. India might easily, and apparently profitably, supply the whole world with Ben or Moringa oil, and it is to be hoped that attention may be directed to the subject." *Dict. of Econ. Prod. of Ind.*

The reason why the seeds are not allowed to attain maturity is simply because the tender fruit is universally used as a popular vegetable, the crop of a single tree occasionally realising five rupees. In other words, the fruit is of more value to the cultivator than the seed would be, unless high prices are offered for the latter.

186 Moringa concanensis, NIMMO.

There is a tree at Bannerghatta in the Anekal Taluk, which may be referred to this species. It is larger in all its parts than *M. aspera* and the flowers are streaked with red. The species has not been observed in local gardens.

Cultivation.—Although it may be difficult to procure seed in quantity, for the reasons explained above, it is abundantly produced in reserved trees and germinates very readily. Being a small tree of

rather short duration, it is usually planted in various nooks and corners, where species of a more permanent nature would not be put. It coppices well, and is usually renovated by that practice when the crops of fruit are falling off or when a tree becomes unshapely.

Easily propagated from cuttings of the matured wood. For exclusive planting the trees should be put out at 15—20 feet apart. Ordinary garden land suits admirably, but occasional top-dressings of lime at one time and rotted farm-yard manure at another will sustain the trees and make them more productive of fruit and seed. These remarks apply to both the *Moringas*.

XXIX. LEGUMINOSÆ.

187 Sesbania ægyptiaca, PERS. *Kan.* Jinangi.

Fig.—*Bot. Plates Lal-Bagh Collection; Wight Ic. t. 32.*

Reference.—*Dict. of Econ. Prod. of Ind.*

A soft-wooded shrub or small tree usually found in swamps and nullahs, Attains maturity rapidly and lives for only 3—5 years.

It is occasionally planted as a support to the betel vine, but is most prized for its medicinal leaves and seed. The pith of the stem is employed by fishermen as floats, while the woody parts afford good material for making gunpowder-charcoal. The species is self-productive in moist situations.

188 Sesbania aculeata, PERS. is a smaller prickly species of annual duration. Found in similar situations.

189 Sesbania grandiflora, PERS. *Kan.* Agase.

Fig.—*Bot. Plates Lal-Bagh Collection.*

Reference.—*Dict. of Econ. Prod. of Ind.*

A slender short-lived tree of domestic cultivation.

There are two varieties, having white and red flowers respectively. The latter are dedicated to *Shiva*, and of all pea-flowers they are perhaps the largest and prettiest. The tree shoots up very quickly and affords an excellent prop for the betel vine. The tender leaves, pods and flowers, are popular native vegetables, while the root, gum, bark and flowers have medicinal properties, of which the people avail themselves to some extent.

Cultivation.—Propagated from seed and self-productive where the surface soil is loose and uneven. In betel gardens the tree is planted in rows at intervals of 3—4 feet. The species requires a somewhat moist situation.

190 Erythrina indica, LAM. *Kan.* Warjipe, Halivana, Palivana.

Fig.—*Bot. Plates Lal-Bagh Collection*; *Wight Ic. t. 58.*

References.—*Pharm. Ind.*; *Dict. of Econ. Prod. of Ind.*

The Indian coral tree, 30 to 45 feet. Scattered throughout the maidan forests and clinging to the foot of the hills, occasionally cultivated for ornament. Bark thin, grey, sparsely protected by small blackish prickles. Leaves deciduous during the cold season, large, 3-foliolate; preceded at the commencement of the hot season by a gorgeous display of coral-red flowers, which are visible from long distances in certain lights. Often employed to form fences around betel gardens and to train the vines over. The species is admirably adapted for this work on account of its rapidity of growth and the facility possessed for its easy propagation by cuttings of all sizes. Although very light—weighing only 20 lb. per cubic foot—and open-grained, the wood is rather durable and takes a good varnish. On the latter account it is much used at Channapatna, as elsewhere, in the

manufacture of lacquered-ware articles. Being white and soft, it is also used for making ornamental boxes, scabbards, trays, drums, masks and panels. It is the *muchi* wood of Madras. Cattle are supposed to be fond of the tender foliage, but the young shoots are rather densely covered with prickles. *Erythrina indica var. alba* has pure white flowers, but in all other respects it is identical with the specific form.

Cultivation.—An exceedingly hardy tree which seems to do equally well in moist or dry land. It is also of easy propagation by seeds and cuttings. Not of very long duration. As a fine flowering tree, it is well adapted for pleasure grounds, where it becomes a conspicuous object in the month of March.

191 Erythrina stricta, Roxb. *Kan.* Kichige, Keechaga.
Fig.—*Bedd. Fl. Sylv. t. 175.*
References.—*Fl. of Brit. Ind.*; *Dict. of Econ. Prod. of Ind.*

This is a larger tree found on the outskirts of the evergreen belt, and at intervals across the plains of Mysore. Trunk and branches rather profusely covered with whitish prickles. Leaves as in the last named. Flowers crimson. To determine between *E. indica* and *E. stricta*, it is necessary to study the morphology, in each species, of the calyx, keel-petals and fruit. The latter contains only 2—3 seeds in the species under notice. Wood very soft and light, occasionally used as deal. In Manjarabad it is also used "for making bowls, pig troughs and rough doors for native houses" *Graham Anderson.*

Although abundant in Coorg, this tree is less known and less utilised than *Erythrina indica.* It requires about the same treatment in cultivation and is easily multiplied by seeds and cuttings.

192 Erythrina ovalifolia, Roxb.

A medium sized tree of the open hill tracts.

Branches pale grey. Prickles black. Leaflets twice as long as broad, the end one very long and ovate to obovate-oblong. Uses of the species unrecorded.

193 **Erythrina suberosa,** Roxb. A deciduous tree of the lower ranges of the Western Ghâts, attaining a height of 40—50 feet. Distinguished from the other species by its ruptured, corky bark, yellowish prickles, and pilose tomentum on the underside of the leaf.

Wood similar to that of *E. indica,* and may be applied to the same uses.

194 **Erythrina glauca,** Willd. An American tree cultivated in the Lal-Bagh, where it attains a height of 50—60 feet. Leaves glaucous. The new species *E. caffra* and *E. latissima,* have recently been introduced from Africa.

195 **Butea frondosa,** Roxb. *Kan.* Muttaga.

Fig.—*Bot. Plates Lal-Bagh Collection. Bedd. Fl. Sylv. t. 176.*

The Pulas kino tree. Commonly known in the north as the "dhak tree." Medium sized. Leaves deciduous in the cold season, and preceded in February or March, by a gorgeous display of orange-crimson flowers. Very common in some of the maidan tracts of Mysore and Coorg, also in the large timber forests of South Mysore. When in full blossom the tree is a conspicuous object throughout the above districts. The polished leaflets are popularly used by the Brahmins in lieu of plates; and the small twigs and branchlets are collected for sacrificial functions. Wood of little value except under submersion, when it is said to be durable. Weight 35 lb. per cubic foot. These uses, added to the medicinal properties of several parts of the species, render it one of the best known trees in India. When wounded, the bark yields a ruby coloured gum of an astringent and brittle nature commonly called "bastard kino." The flowers, treated with alum, yield the dye commonly used during

the *Holi* festival. Anthelmintic properties are attributed to the seeds, especially in veterinary practice, being a well known remedy for horses. The lac insect is propagated on the tree in Oudh, the Central Provinces and Gujerat.

Cultivation.—Seeds germinate very freely (80 per cent) within 15 to 20 days. Swampy land is unsuited for the cultivation of the species, which affects dry situations among rocks and where the subsoil is more or less gravelly. Plant at 25 to 30 feet apart.

196 Dalbergia Sissoo, Roxb. *Kan.* Biridi, Bindi, Cishmabage.

Fig.—*Bot. Plates Lal-Bagh Collection. Bedd. Fl. Sylv. t. 25.*

References.—*Brand. For. Fl. 149; Dict. of Econ. Prod. of Ind.*

This elegant tree is now common about Bangalore, but elsewhere it is sparsely cultivated, and is not generally found in the provincial forests. Of all local trees, it has proved the fittest for planting in rocky land, and where the soil is naturally poor and stony. Seasoned timber weighs 45—50 lb. per cubic foot. It is strong, elastic, and well adapted for works of engineering, carpentry, and cabinet furniture. In the latter utility the heartwood alone is suitable, being easily seasoned, distinctly coloured and susceptible of a fine polish. The Sissoo is also known to be a first class wood where great elasticity is required, as in the construction of boats and carriages. But in this part of India the economic properties of the species are practically unknown. In the north it is well known and much appreciated as a timber tree. Possessing pretty foliage and a distinct habit of growth, it is an effective tree for grouping in pleasure grounds, where it is very rarely quite bare of leaf.

Cultivation.—Seeds germinate readily in the nursery-bed, and the species is very self-productive by

means of offsets from the root. In this way, a little family of young trees will often be found around the parent. Stony, gravelly and sandy soils are the most suitable, but depth is required as the tree forms a long tap-root. Growth is usually rapid and the species coppices well. It is too valuable for fuel, otherwise it is admirably suited to raise plantations on waste land for that purpose.

197 Dalbergia latifolia, Roxb. *Kan.* Bite, Beetee, Biti, Thodagatti.

Fig.—*Wight Ic. t. 1156. Bedd. Fl. Sylv. t. 24.*

References.—*Brand. For. Fl. 148. Dict. of Econ. Prod. of Ind.*

The blackwood or rosewood of Southern India. A deciduous tree of the Mysore and Coorg forests, where it attains a large size and affords timber of the best quality. It is a reserved tree of the State forests and therefore well known to the officials of the forest department. Sapwood yellow, comparatively small; heartwood purplish-black, heavy—weighing 55—60 lb. per cubic foot—durable, close-grained, but somewhat brittle. It is a valuable wood for all classes of furniture and cabinet work, and is used in preference, when procurable, for railway sleepers, gun-carriages, cart-wheels and knees of vessels. But these demands make it expensive, and a single tree has been known to sell for Rs 70, while in the Coorg forests the Government rate is 5 to 6 annas a cubic foot. The timber is exported to Europe from the Malabar forests *viâ* western ports. Coffee flourishes under the *Bite*, and some planters maintain that the latter affords the best shade for that important cultivation. Anderson mentions that "chips are burnt in cressets by the natives at festivals and give a splendid light." Rosewood inlaid-work has become a local industry in the city of Mysore under the auspices of His Highness the Maharaja.

Cultivation.—The *Bite* possesses great vitality and is reproductive from seed and coppice. Seeds germinate freely in the nursery also. With regard to position the tree does equally well in mixed or evergreen zones, providing that the soil is deep and the elevation 2,500 to 4,000 feet. A good rainfall is also favorable, as it is noticed that the trees are smaller in size as they approach the dry districts.

In forming an exclusive plantation of this species, the seedlings could be planted at 15 feet apart with the view of subsequently removing every alternate sapling.

198 Dalbergia rubiginosa, Roxb. An extensive woody climber of the Western Ghâts.

199 Dalbergia sympathetica, Nimmo.

A powerful climber having strong recurved thorns. Flowering in February and March. The roots and leaves afford native drugs, and the bark is used to remove pimples.

200 Dalbergia lanceolaria, Linn. *Kan.* Hassur ganni, Hasar ganni.

Fig.—*Wight Ic. t. 266; Bedd. Fl. Sylv. 88.*

References.—*Brand. For. Fl.; Dict. of Econ. Prod. of Ind.*

A large tree of the deciduous forests. Flowering in March and ripening its fruit in June. Very attractive while in leaf, and worthy of a central place in ornamental grounds.

Wood whitish, heavy, weighing 62 lb. per cubic foot, but not very durable, although it is said to be used for building in some parts of India. Medicinal properties are attributed to the root and bark, as also to an oil which is expressed from the seed. The species can be propagated from seed, and grows well in garden, forest, or loamy soils. A highly ornamental tree, although bare of leaf for rather a long period.

201 Dalbergia paniculata, ROXB. *Kan.* Pachari, Pachali, Pachale, Pacheri.

Fig.—*Bedd. Fl. Sylv. t. 88.*

References—*Brand. For. Fl. 150 ; Fl. of Brit. Ind.* ; *Dict. of Econ. Prod. of Ind.*

A tall deciduous tree. Tolerably common, but of small growth at Nundydroog. In Shimoga, and the open Malnad generally, the species attains its full size. Wood greyish-white, of little value, being soft and very subject to the attacks of insects. Weight, when seasoned, 38—48 lb. per cubic foot. Not considered good for fuel, although it is occasionally recommended for that use. M. Venkatnarnappa reports that in Shikarpur the tamburi, vina, and other musical instruments are manufactured from the seasoned wood. Lovery says it is used for fuel in Shimoga. The tree comes into flower and young leaf in the hot season, and ripens fruit in July or August. Seeds germinate at about the rate of 50 per cent. Cultivation is easy.

202 Pterocarpus santalinus, LINN. *Kan.* Kempugandha chekke, Rakta-chandana.

Fig.—*Bedd. Fl. Sylv. t. 22 ; Bentl. & Trim. t. 82.*

References.—*Pharm. Ind.*; *Dict. of Econ. Prod. of Ind.* ; *Fl. of Brit. Ind.*

The red Sanders or Sanders red tree. Also, but erroneously, called the red sandalwood. A small deciduous tree of the Cuddapah and Arcot districts, and extending sparsely to the eastern hills of Mysore. Cultivated in the forest plantations of the Nundydroog division, but not generally found in the maidan forests. In flower and fruit the species bears a close resemblance to *Honne*, but it is a much smaller tree while the leaflets are rarely more than three in number.

When freshly cut, the heartwood is of a rich orange-red colour, but on exposure it becomes pur-

plish-black. Reduced to a paste on a wet slab, the coloured wood is used to smear the body during ablutional and religious ceremonies; and it is chiefly on this account that it has become associated with real sandalwood, *Santalum album*. "The wood is of a fine red colour and beautifully streaked, very hard and heavy,—Weight about 76 lb. per cubic foot, and sufficiently heavy to sink in water — and takes a fine polish; it is much used and highly prized by the natives for building purposes and for turnery in Madras and the districts in which it grows; it is also largely exported from Madras as a dye wood, and used as ballast; it is a very small tree, not often found over 3½ or 4 feet in girth and about 20 to 25 feet in height, the largest trees reach 4½ feet in girth but are then much heart shaken or hollow. The largest tree in our plantations is five years old, and is 18 feet 5 inches high and 9 inches in girth. A bandy-load of selected logs will sell for as much as 200 rupees, *i. e.*, 20 logs at 10 rupees each; the roots and stumps used for dyeing purposes, sell at 6 to 9 rupees the 1,000 lbs. The cattle during the dry season are much fed upon the leaves of this tree, and young saplings are often bodily cut down by thousands by the cowherds." *Beddome.*

Red Sanders wood is not attacked by white ants, and it is well known in Europe as an ingredient in French polish.

Cultivation.— Propagate from seed gathered in June. The usual practice is to sow the entire pod, containing one or two seeds, after steeping it for 24 hours in water; it is then pressed firmly into the soil edge-wise, so that the wings are at right angles to the surface. Treated in this way, all the fertile seeds will germinate within 20 to 25 days. But seedlings are delicate during the first six months of their existence, and over-watering during that period would have the same disastrous result as giving no

water at all. At six months of age the seedlings should be carefully transplanted into tile-pots or wicker baskets, which are removed at once to a protection ground. The species affects warm rocky situations where the soil is neither very rich nor very poor. Permanent saplings should stand 20 feet apart. Government plantations would be likely to succeed well in the direction of Maklidrug, Thondebhavi and Goribidnur.

203 Pterocarpus Marsupium, Roxb. *Kan.* Hone, Honne, Bibla.

Fig.—*Bot. Plates Lal-Bagh Collection*; *Bedd. Fl. Sylv. t. 21*; *Bentl. & Trim. t. 81.*

References.—*Fl. of Brit. Ind.*; *Dict. of Econ. Prod. of Ind.*; *Pharm. Ind.*

The Indian kino tree. Common in all the deciduous forests of Mysore and Coorg, but small and rare in the drier zones. Leaves 5—7 pinnate, deciduous, or often only subdeciduous, in the months of June or July. Flowering in October, and maturing fruit in February; flowers golden-yellow. Pod roundish, winged, containing one or two seeds. Wood close-grained, reddish-brown, tough, strong, durable, seasons well and takes a good polish. Weighs 53 lb. per cubic foot. Stains yellow when wetted and discolors moist plaster. Except that it is somewhat difficult to work, this timber possesses great merit and frequently sells almost as well as teak; it makes beautiful furniture and is widely utilised for carts, felloes, posts, window frames, doors and agricultural implements. The bark when wounded, or naturally, yields a beautiful crimson gum—the true kino of commerce—which forms one of the minor products of the State forests. Kino is an article of export and is locally offered for sale in the form of blackish-red angular fragments full of cracks; and owing to its high export value, 'Pulas Kino' (*Butea frondosa*) and other inferior substitutes are replacing the true kino in

native medicine. This valuable tree is reserved by Government.

Cultivation—. The seeds are occasionally unfertile, but collected from healthy trees and treated as directed for the preceding species, they will germinate. The outer zone of the Malnad, where the rainfall increases from 50 to 100 inches per annum appears to be the most favourable situation for this tree. Permanent saplings should stand at 30 feet apart.

204 Pongamia glabra, VENT. *Kan.* Honge.

Fig.—*Bot. Plates Lal-Bagh Collection. Bedd. Fl. Sylv. t. 177.*

References.—*Drury U. Pl.; Dict. of Econ. Prod. of Ind.*

The Indian beech. A deciduous or subdeciduous tree of moist situations, especially near the sea-coast. Common in Mysore and Coorg, where it is well known and much planted as an avenue tree. With shining green leaves, and pendent racemes of lilac-rose to nearly pure white flowers, half concealed in the leafy foliage, it is admirably adapted for the above purpose. The species comes into full leaf early in March when other trees are mostly dormant and is then an object of admiration and shelter to the weary traveller.

Wood tough and light, weighing about 40 lb. per cubic foot, white when cut, but turning yellow on exposure, coarse-grained, fibrous and not durable, said to improve when seasoned in water. Large trunks are prized for waddar cart-wheels. Honge oil, expressed from the seed, is a valuable article in medicine and lighting. Nearly every part of the tree is used in native pharmacy, more especially in the cure of rheumatism and skin diseases. Leafy boughs of the tree are laid into the paddy fields as green manure, with good results to the crop. When collect-

ed into a small pit and allowed to ferment for a few weeks, the flowers become a useful fertiliser for plants in pots. Honge cake is a valued manure for certain crops and especially for coffee, in Mysore and Coorg.

Cultivation.—Removed from the pod, the seeds germinate freely under the usual treatment; and seedlings are large enough to put out permanently in the second year of cultivation in the nursery. They should be planted in naturally moist situations, as by the sides of tanks and streams and in the dips of valleys. Forty feet should be allowed between the trees.

205 Cæsalpinia Bonducella, FLEMING. *Kan.* Sanna Gajjiga.

Fig.—*Bot. Plates Lal-Bagh Collection.*

An extensive climber armed with numerous prickles. It forms impenetrable thickets around villages and wherever it is allowed scope. This is the species with small seeds.

206 Cæsalpinia Bonduc, ROXB. *Kan.* Gajjiga.

Fig.—*Bot. Plates Lal-Bagh Collection.*

The fever nut or nicker tree. An immense climber possessing the same characteristics as the preceding species but larger in nearly all its prominent parts. The leaden coloured seeds are used by the village children in lieu of marbles; their principal use, however, is in native medicine, for which they possess a marketable value of about Rs. 12 per cwt. They contain a fixed oil-resin, with a bitter substance, which is used as an antiperiodic in fever.

207 Cæsalpinia Sappan, LINN. *Kan.* Patanga, Sappanga.

Fig.—*Bot. Plates Lal-Bagh Collection.*

References.—*Dict. of Econ. Prod. of Ind.; Pharm. Ind.*

The sappan-wood tree. A small thorny tree or woody climber of the deciduous tracts. The red heart-wood affords a dye which is largely consumed in the preparation of *Gulal*. Wood whitish when cut, but quickly turning red from exposure; solid, close-grained and susceptible of a good polish. Weight 52 to 60 lb. per cubic foot; it imparts a reddish colour to water and is said to possess medicinal properties. Sappan dye commands a fair price in the Indian market; but the tree is not very abundant in Mysore or Coorg. It is easily raised from seeds, in fact reproductive, and is rather showy with its finely pinnate leaves and large yellow flowers.

208 Cæsalpinia pulcherrima, SWARTZ. *Kan.* Kenjige, Ratnagandi.

Fig.—*Bot. Plates Lal-Bagh Collection.*

A small deciduous tree or large shrub, according to position. Confined to gardens, where it is mostly cultivated for ornament. The species is best known to English residents by the names "Flower Fence" and "Barbadoes Pride." Flowers large and showy, red, tinged with yellow, and in the variety *lutea*, wholly orange-yellow. Ink is made from the charred wood, while nearly every part of the tree is supposed to possess some medicinal virtue. The flowers are placed in the Hindu temples.

Cultivation.—Raise from seed and plant at intervals of 20 feet in the centre of a large shrubbery. Special soil is not needed, but the situation should be naturally or artificially drained.

209 Cæsalpinia sepiaria, ROXB. *Kan.* Kurudu Gajjige, Hotsige.

Fig.—*Bot. Plates Lal-Bagh Collection. Wight Ic. t. 37.*

Reference.—*Dict. of Econ. Prod. of Ind.*

The Mysore thorn. A prickly climber of ample dimensions, usually found on the outskirts of villages,

to which it was a source of protection in former days. It forms an impenetrable thicket, and is said to have been employed by Hyder Ali to cover his fortifications. It is a good nurse-plant for sandal seedlings, and would form an excellent fence for plantations. The flowers are in bright yellow racemes and very pretty.

210 Cæsalpinia coriaria, Willd.

The American sumach or divi-divi. An umbrella-shaped tree with beautiful dark-green foliage and small yellow flowers. Cultivated at Bangalore and in a few provincial stations, but nowhere on a large scale. There are some good trees in the compound of Stewart's Coffee Works at Hunsur, as also on Mr. Petrie Hay's property in the same town. The divi-divi is rather slow of growth at first, but once started is very tenacious of life, and apparently lives to an old age. As a tanning material, the sinuous pods are of great value. The few trees in local cultivation fruit abundantly every year, and there is reason to suppose that the species would become remunerative in the forests. Full-sized pods contain 50 per cent of pure tannin and are worth 100—150 rupees a ton. One or two fine trees may be seen in the Residency grounds at Bangalore. Seeds have been distributed far and wide for many years. In forming a plantation final trees should stand at 40 feet apart. Wood of little value.

211 Cæsalpinia tinctoria.

A small tree of South America. Cultivated in the Botanical Gardens.

212 Peltophorum ferrugineum, Benth.

Reference.—*Benth. Fl. Austr.*

A tall unarmed tree of the subdeciduous tracts. Good for scenic planting. Flowers yellow and showy. Economic properties unknown.

213 Pterolobium indicum, A Rich. *Kan.* Bada bakka.

Fig.—*Bot. Plates Lal-Bagh Collection. Wight Ic. t. 196.*

A prickly climber of the scrub tracts. Suitable for fencing, except that sheep and goats are very fond of the tender herbage. A showy plant with a peculiar winged fruit, which assumes several pretty colours during growth. Flowers pale yellow.

214 Poinciana elata, LINN. *Kan.* Sunkatti.

Fig.—*Bot. Plates Lal-Bagh Collection. Bedd. Fl. Sylv. t. 178.*

References.—*Dict. of Econ. Prod. of Ind.; Pharm. Ind.*

A small tree of the maidan, but not very abundant anywhere. There are a few specimens in the compound of the Travellers Bungalow at Mysore. The native herbalist attaches much importance to the medicinal virtues of the leaf, the juice of which is recommended for rheumatism, flatulence, and general debility; it is also given to women after confinement. Although small in size, this tree is ornamental while in leaf and flower; the latter is large, pale yellow, with reddish filaments of ample dimensions. The wood is said to be fairly good for cabinet work and weighs, when seasoned, 45 lb. per cubic foot. The tree is bare of leaf in December or January.

Cultivation.—Easily propagated from cuttings, and well suited for cultivation on the plains of Mysore in porous soils. Plant at 25 to 30 feet apart.

215 Poinciana Regia, BOJER.

Fig.—*Bot. Plates Lal-Bagh Collection.*

The goldmohur tree. Introduced from Madagascar and cultivated in local gardens for scenic effect. Deciduous during the cold season and bursting into splendid blossom during the months of March, April and May.

Flowers large and clustered, crimson-yellow to gold and nearly pure white, streaked with scarlet and crimson of many hues.

As a flowering tree, the 'Goldmohur' or 'Mascarene' is certainly one of the most gorgeous we possess. It is spreading to the villages and will eventually become naturalised. Easily raised from seed, but soft wooded, and not very long-lived. For avenues, plant at 40 feet apart.

216 Parkinsonia aculeata, Linn.

The Jews thorn. A shrub or small tree cultivated in the Lal-Bagh. Flowers bright yellow. Indigenous to tropical America.

217 Cassia Fistula, Linn. *Kan.* Kakke, Kakee.

Fig.—*Bot. Plates Lal-Bagh Collection. Bedd. Fl. Sylv. 91. Wight Ic. t. 269.*

References.—*Dict. of Econ. Prod. of Ind.; Pharm. Ind.*

The Indian laburnum. On the plains this is little better than a shrub, or at best a small tree; but towards Coorg and West Mysore it attains a height of 30—40 feet, and is described as an exceedingly handsome tree while in blossom. The species succeeds well near the sea coast also, and good specimens may be seen in Madras, especially in the compound of St. George's Cathedral, where it flowers profusely in the month of June. But on the Mysore plateau and on the lower ranges of the Nilgiri hills, it will be seen in blossom during the months of April and May; its pendent racemes of rich golden-yellow flowers often shrouding the tree from top to bottom.

Wood small but durable, weighing 50 lb. per cubic foot; heartwood reddish-brown to brick-red, hard, but brittle and apt to fracture. Used for paddy grinders, posts and agricultural implements. The bark affords fibre, tannin and gum. The fresh pulp of the fruit—a blackish terete pod nearly 2 feet in length—is a well known purgative, and the parched leaves are eaten with ordinary food as a mild laxative.

Cultivation.—In nature this tree affects dry situa-

tions on the lower ranges of the hills where, however, the rainfall is pretty constant and heavy. It also thrives better at the sea coast than in the interior plains. Under careful management the seed germinates sparsely in three months from time of sowing. There does not appear to be any reproduction from seed in the jungle, although the plant is self-multiplied by suckers and offsets. It should find a place in garden shrubberies. Bare of leaf in the month of January.

218 Cassia marginata, Roxb.

Fig.—*Bedd. Fl. Sylv. t. 180; Bot. Plates Lal-Bagh Collection.*

References.—*Fl. of Brit. Ind.; Dict. of Econ. Prod. of Ind.*

This beautiful evergreen tree is cultivated for ornament in local gardens, at Mysore, and in a few provincial towns. It is said to be indigenous to the Western Peninsula, but there is no record of its being other than cultivated to a small extent within the territories of Mysore. It forms an attractive picture in the months of June and July when covered with its rosy-red flowers on pendent branches, the latter often sweeping the ground. A few good specimens are prominently situated in the Cubbon Park, where they are much admired. Wood said to be hard and durable. The flowers are very fragrant.

Cultivation.—Seeds are uncertain and very slow of germination, unless they are forced in half-fermented litter such as rapidly decaying leaves. Sown in ordinary soil they rarely sprout at all. In the early stages of development the seedlings grow slowly, and a little forcing is necessary to them also. For avenues, this tree should be planted at 35 to 40 feet apart.

219 Cassia occidentalis, Linn. *Kan.* Koltagaci, Dodda tagaci.

An annual or biennial shrub of waste tracts; readily determined by its fœtid odour. The legume resembles a walking stick, and hence the vernacular name applied to the species. Medicinal properties are attributed to the leaves and seeds.

220 Cassia sophera, LINN. Very like the preceding species and also medicinal.

221 Cassia auriculata, LINN. *Kan.* Olle tangadi, Tangadi, Avarike, Avara.

Fig.—*Bot. Plates Lal-Bagh Collection.*

References.—*Dict. of Econ. Prod. of Ind.*; *Drury U. Pl.*

This useful shrub is commonly known to Europeans as the "tanner's bark" and to the Kanarese people as *olle tangadi.* It is abundant in most of the scrub tracts, where it commands attention both for ornament and utility.

The bright yellow flowers, produced in ample clusters at the ends of the branches, lend interest to the landscape, and are often admired from the passing train. Tangadi bark is indispensable to the local tanner, as also to workers in iron who use the root-bark for tempering iron with steel. There is therefore a brisk local trade in the product, although when grown on Government land it is subject to a seigniorage of Rs. 20 a cartload. But delivered in the bazaar, a cartload usually weighs 80—100 maunds of 100 lb. each, valued at 14 ans. to one rupee per maund. As analysed by Professor J. J. Hummel, Director of the Dyeing Department of the Yorkshire College, Leeds, the bark of *Cassia auriculata* contained 20·5 per cent of tannic acid. It is therefore one of the richest substances for tanning. The bark and seeds are much esteemed in Indian pharmacy. Being so abundant in the wild state the bush is rarely cultivated, but the natural supply can easily be supplemented by this means should the demand for bark

increase. The species should be included in garden shrubberies.

222 Cassia siamea, LAM. *Kan.* Sime Tangadi.

Fig.—*Bot. Plates Lal-Bagh Collection. Bedd. Fl. Sylv. t. 179.*

References.—*Dict. of Econ. Prod. of Ind.*; *Kurz. For. Fl. Burm.*

An evergreen tree of moderate to large size and quick growth. Best known by its former name, *Cassia florida*, Vahl. Rather extensively planted as an avenue tree and for fuel, for which it is well adapted. Beddome describes the wood in the following words:—

"The wood is of a yellowish brown colour sometimes beautifully marked with irregular black streaks, close-grained, hard and durable, but not stiff, works kindly with a smooth surface and stands a good polish, a cubic foot unseasoned weighs 68—70 lb. and when seasoned 58 lb." This tree, which is otherwise desirable for planting in the forests, has the peculiarity of suddenly dying out in certain localities. The cause of this is not fully investigated, but it is possibly due to the presence of sulphate of iron or some equally injurious mineral in the subsoil.

Cultivation.—When they fall upon a moist uneven surface, the seeds of this hardy tree are self-productive. The species also coppices well.

Nursery seedlings can be raised in great numbers without any trouble. In plantations the latter should be put out at 12 feet apart, the ultimate distance between permanent saplings being 24 feet. It affords excellent fuel.

223 Cassia glauca, LAM.

An ornamental tree cultivated in the Lal-Bagh. Indigenous to Burmah, Ceylon and Malacca. Balfour states that the bark, mixed with sugar and water, is given in diabetes.

224 Hardwickia binata, Roxb. *Kan.* Karachi, Kammar, Asanagurgi, Kamra.

Fig.—*Bedd. Fl. Sylv. t. 26.*

References.—*Dict. of Econ. Prod. of Ind.*; *Gamb. Man. Timb.*

A deciduous tree of the maidan forests, but mostly confined to the Tumkur and Chitaldroog Districts, where it attains fair growth. Very abundant in the Bukkapatna forest of the Sira Taluk. The maximum height of 100 feet is rarely attained in Mysore, although trees of that size are not uncommon in the Salem and Coimbatore districts. It is a reserved tree affording one of the most durable timbers in India. Heartwood abundant, close-grained, dark-red tinged with purple; soft and easy to work when newly cut but subsequently becoming extremely hard and difficult to manipulate. Weight, unseasoned, 80—82 lb. per cubic foot; seasoned wood is considerably lighter, takes a fine polish, and is well adapted for cabinet and artistic work. In the localities where it grows, it is much used in the construction of bridges, houses, and agricultural implements; and being durable underground, it is an invaluable timber for works of mining and engineering. Other useful products are afforded by the species in the shape of gum, tan, fibre, and fodder. With regard to the last named product, which consists of the young shoots and leaves, some restrictions are necessary to protect such a valuable tree from the rapacity of cowherds and cattle.

"Cattle being very fond of the leaves, the tree is pollarded to a frightful extent wherever it grows. It is heart rending to see the damage done in the Cauvery forests." *Beddome.*

Cultivation.—This species is confined to the deciduous forests of South and Central India, where it is found at intervals on sandstone, trap, and even granite. In the matter of soil and rainfall, it is somewhat peculiar. Seeds germinate pretty well.

225 Hardwickia pinnata, ROXB. *Kan.* Yenne mara.

Fig.—*Bedd. Fl. Sylv. t.* 255.

References.—*Gamb. Man. Timb.*; *Dict. of Econ. Prod. of Ind.*

A large tree of the Malnad and Western Gháts. It yields, from the heartwood, a balsamic oleo-resin of some importance. The following is an abbreviated note of Mr. Broughton's report on the oil:—

"It appears to consist of chemically different resins in an essential oil, is in fact an oleo-resin. Like the wood oils from the different species of *Dipterocarpus*, it greatly resembles, both in composition and properties, the Copaiva balsam, though it lacks the transparency and light yellow colour of the latter. It is nearly entirely soluble in ammonia, but does not produce a clear solution. The essential oil has the same composition as that from Copaiva balsam. ... ...

The balsam is well worthy of being tried in medicine, since from the composition it appears to be well suited for employment, at least in the neighbourhood of the country in which it is collected."

The timber is used for building in the inhabited localities where it grows. Weight about 47 lb. per cubic foot. Heartwood brown, and much reduced in proportion to the sapwood.

226 Saraca indica, LINN. *Kan.* Asoka, Ashoka, Achenge.

Fig.—*Wight Ic. t. 206. Bedd. Fl. Sylv. t. 57.*

References.—*Fl. of Brit. Ind.*; *Dict. of Econ. Prod. of Ind.*

An evergreen tree of great beauty, especially while in young leaf and flower. Ascending to 3,000 feet in the Malnad and Coorg, but often planted on the plains, in gardens, and in the vicinity of temples.

Cultivated in the Lal-Bagh. The flowers, which are rich orange changing to dull red, are produced in ample corymbs between the leaves during the hot season. They are in demand for the temples, and the whole tree is prized by the Hindus for its medicinal properties and great beauty. In the open Malnad it would form beautiful avenues, in private grounds. The quality of the timber is unknown, beyond the fact that the heartwood is dark-coloured. Propagation from seed is easy.

227 Tamarindus indica, LINN. *Kan.* Hunise, Hunase.
Fig.—*Bot. Plates Lal-Bagh Collection. Bedd. Fl. Sylv. t. 184. Bentl. & Trim. t. 92.*
References.—*Brand. For. Flora; Fl. of Brit. Ind.; Pharm. Ind.*

The tamarind tree. Being self-sown and popularly planted everywhere, this handsome species is well known to the people. It is of slow growth, but possesses so many useful properties, added to a symmetrical and pleasant exterior, that it is widely cultivated in avenues and topes. A large evergreen tree, attaining in favorable localities to 80 feet. It flowers very profusely in April and May and yields a crop of fruit in the cold season. Heartwood very hard and durable but difficult to work. Weight about 60 lb. per cubic foot. Highly prized for the naves of wheels, rice pounders, mallets, tent pegs, paddy crushers, oil and sugar mills, and the turning lathe; also for various articles of furniture; handles to tools and such like. Cultivated almost entirely for its fruit, the pulp of which contains citric, malic and tartaric acid. This pulp is extensively used in food, and diffused in water, to which is added a little sugar and cardamom powder, it makes a popular cooling drink. Tamarind seeds are roasted and eaten by many classes, while the lower orders occasionally use them as a masticatory (in the raw state) in lieu of betel-nut. Important medicinal pro-

perties are attributed to the fruit, leaves, and seed. A cement is also made from the latter which is generally used by the Kurbars as a dressing to kamblies or country-made blankets. The acid exhalation from the foliage of the tamarind tree is said to be injurious to health, on which account the peasants will rarely sleep under it. Grasses and other plants languish under its shade, and eventually die off as the shade becomes denser; but this in all probability is due to the absence of sufficient light, and the presence of numerous surface roots which monopolise the space under the branches of the tree. The tamarind tree assumes the form of a gigantic bouquet, and is an admirable subject for avenue and scenic planting.

Cultivation.—Tamarind seeds germinate very freely and there is no trouble in transplanting seedlings while they are under a foot in height. But for roadside planting it is advisable to rear the seedlings in baskets or tile-pots until they are about two feet high. Growth is usually very slow in hard or stiff adhesive soils, but when the soil is made up, or naturally of a loose nature, the growth will be comparatively rapid, although never very rapid in the case of this species. A good crop of tamarind fruit, the produce of a single tree, will realise Rs. 4—5, while the bazaar value of fruit-pulp is Rs. 2—3 per maund of 25½ lbs.

228 Bauhinia tomentosa, LINN. *Kan.* Vana sampage.

Fig.—*Bot. Plates Lal-Bagh Collection. Bedd. Fl. Sylv. 92.*

Reference.—*Dict. of Econ. Prod. of Ind.*

A shrub of the scrub-tracts. Occasionally cultivated in gardens for its fragrant leaves and pretty yellow flowers. The former are said to cure headache and are externally applied for that purpose, es-

pecially by women after their confinement. Medicinal properties are attributed to nearly every part of the shrub.

229 Bauhinia acuminata, LINN.

A shrub or small tree with handsome white flowers, which are very fragrant. Properties unknown.

230 Bauhinia Vahlii, W. & A.

Fig.—*Bot. Plates. Lal-Bagh Collection.*

Reference.—*Dict. of Econ. Prod. of Ind.*

This enormous camels-foot climber is indigenous to the Malnad, where it probably gives the forester a good deal of trouble by its widespreading investment of forest trees. But although troublesome as a neighbour, this splendid climber possesses useful properties and is of much value to the tribes of the lower Himalaya, to whom it affords cordage, food, and medicine. The bark yields a strong fibre, and the seeds are eaten by the hill people, both raw and fried. A fine specimen may be seen in the Botanical Gardens, where it has been cultivated for 30 years.

231 Bauhinia purpurea, LINN, *Kan.* Kanchivala, Sarul.

Fig.—*Bot. Plates Lal-Bagh Collection. Bedd. Fl. Sylv. 92.*

References.—*Fl. of Brit. Ind.; Dict. of Econ. Prod. of Ind.*

A moderate-sized tree of the dry zone. Leaves subdeciduous in the hot season. Not uncommon in the maidan forests, and about villages. Wood pinkish white, changing to dark brown on exposure; used for agricultural implements and as a fuel tree. Weight 50—54 lb. per cubic foot. Medicinal properties are attributed to the bark, root, and flowers. Lovery states that the tender leaves and flowers are eaten in Shimoga.

Cultivation.—Although of slow growth the tree is easily propagated by seed, and flourishes in waste

land. The reddish-purple flowers are attractive. The vernacular name *Kanchivala*, applies more or less to all the species of *Bauhinia*.

232 **Bauhinia variegata,** LINN. *Kan.* Bili Kanchivala.

Fig.—*Bot. Plates Lal-Bagh Collection.*

This, like the foregoing species, is commonly known as the camel's-foot tree. It is small or medium-sized according to the nature of the soil in which it grows. The flowers, which are very attractive and fragrant, appear in great profusion, first during the hot season, while the tree is bare of leaf, and again in September or October. The flower is 3 inches across and varies in tint of colour from pure white to violet and rosy purple.

The economic properties of the species are about the same as in *B. purpurea*, but are scarcely utilised in this part of India. The bark affords a very fair tan. Cultivation as in the foregoing species.

233 **Bauhinia monandra,** KURZ.

Similar in character to the last named but more spreading in habit and having the flowers mottled and striped in white, crimson, yellow and gold. Very effective in Park scenery. A few nice specimens may be seen in the private grounds of Beaulieu, where they flower profusely every hot season. Mr. Ricketts has distributed seeds of this beautiful tree far and wide.

234 **Bauhinia malabarica,** ROXB. *Kan.* Basavanapada.

A deciduous tree of moderate size. Erect in habit, and very bushy while in leaf. Wood dark brown. Used occasionally for agricultural implements, and somewhat extensively for fuel. Weight 42—48 lb. per cubic foot. The tender foliage is cooked as greens in some parts of the hill country.

235 **Bauhinia Hookerii,** F. MUELL.

An elegant tree from North Australia. Cultivated in the Lal-Bagh and deserving of wider utility.

236 Xylia dolabriformis, BENTH. *Kan.* Jambe, Shilve.
Fig.—*Bedd. Fl. Sylv. t. 186.*
References.—*Brand. For. Fl. 171 ; Fl. of Brit. Ind.*

The Erool tree. A tall unarmed tree of Coorg and the Malnad. Leaves deciduous at the close of the cold season. Lovery describes the wood as follows:—" A large tree growing extensively in many places and much in demand for building, agricultural implements, and fuel from which the best charcoal is obtained. Wood dark red or brown, very strong, hard, tough, and durable above or below the ground, without being attacked by the white ants. It takes paint or varnish well. Weight 65 lb. per cubic foot."

The charcoal furnished by this tree is highly prized by the iron smelters. It is one of the so-called iron woods of Mysore, and of unreserved timber trees *Jambe* appears to be one of the most useful. The fruit ripens in January and is eaten by some classes. Specimens are needed for herbaria, with fuller information.

237 Adenanthera pavonina, LINN. *Kan.* Manjadi, Manjatti.
Fig.—*Bedd. Fl. Sylv. t. 46.*
References.—*Brand. For. Fl.; Dict. of Econ. Prod. of Ind.*

The redwood tree. Sometimes, but erroneously, called the red sandalwood, *Pterocarpus santalinus* being the correct source of the latter product, so-called. A large, deciduous tree of the dry and mixed zones. Readily identified by its bright scarlet seeds, commonly used as weights by goldsmiths and others. Each seed is supposed to weigh exactly 4 grains. They are also worn as bead-necklaces and form a good cement when powdered and treated with borax. Heartwood reddish, hard and very durable. Rubbed upon a wet stone it affords the

red paste (see also *Pterocarpus santalinus*) which Brahmins apply to the forehead after bathing. Weight 56—58 lb. per cubic foot. The seeds and leaves have medicinal properties.

Cultivation.—In loose soil this tree is of fairly rapid growth, but when the roots meet with obstruction, as in a hard subsoil resting under a shallow surface soil, the tree becomes stunted. Seeds germinate with great facility and the seedlings are not delicate to handle. Large pits should be made at 24 feet apart.

238 **Prosopis spicigera**, LINN. *Tam.* Perumbe, Vunne?

Fig.—*Bedd. Fl. Sylv. t. 56.*

References.—*Brand. For. Fl.*; *Dict. of Econ. Prod. of Ind.*

This is a small but characteristic tree of the mixed zone. Slightly thorny, with slender grey branches. Leaves deciduous in the cold season, bipinnate; leaflets 16—24, sessile, ligulate to lanceolate, very narrow and slender. Pod grey, 6 in., straight, slender and torulose, containing a mealy substance which is eaten. Sapwood large and perishable; heartwood extremely hard but not durable. Weight 58 lb. per cubic foot. Much prized as a fuel tree and always employed, where procurable, for locomotives. It also coppices well and is easily raised from seed, in short, one of the best trees for fuel plantations. *Prosopis glandulosa*, the 'mesquit bean' tree, and *P. juliflora*, are American species cultivated in the Botanical Gardens.

239 **Dichrostachys cinerea**, W. & A. *Kan.* Wadu warada.

Fig.—*Bedd. Fl. Sylv. t. 185.*

Reference—*Dict. of Econ. Prod. of Ind.*

A thorny shrub or stunted tree of the maidan, especially around low stony hills. Wood small, but

heavy and exceedingly hard. Much valued for tent pegs and walking sticks. Weight 70—80 lb. per cubic foot.

240 Parkia biglandulosa, W. & A.

An evergreen tree introduced from Africa and the Malay Peninsula. Cultivated in gardens, and occasionally at the roadsides in Bangalore, Mysore, and a few provincial towns. Leaves finely pinnate. The inflorescence is remarkable, consisting as it does of numerous globular heads suspended by a long peduncle. At first the heads are of a brown velvetty colour changing to a darker hue, but when the flowers open they become white, and trees laden alternately with these white and dark balls command a close inspection. A large quantity of pollen is discharged from the flower-head, which, if collected and stirred in water, affords a refreshing drink. The quality of the wood is unknown, but the trunk is tall, well-formed and encased in a thin whitish bark. Foliage not unlike that of the gold-mohur tree, *Poinciana Regia.* The species is easily propagated from seed, is of moderately quick growth and requires no special treatment. The pods are produced in clusters and contain a mealy substance, which has not been utilised locally.

241 Leucæna glauca, BENTH.

Fig.—*Bot. Plates Lal-Bagh Collection.*

A small, deciduous, tree of gardens and waste places, but originally introduced from tropical America. Flower heads rather large, pure white, and appearing profusely in the rainy season. Useful for small fuel. Dr. Bidie remarks that at Madras the seeds are used for making fancy articles. The species is self-productive.

242 Acrocarpus fraxinifolius, WIGHT. *Kan.* Belangi, Havulige, Howlige, Hautige.

Fig.—*Bedd. Fl. Sylv. t. 44. Wight Ic. t. 254.*
References.—*Dict. of Econ. Prod. of Ind.; Fl. of Brit. Ind.*

A very lofty tree of the Coorg and Malnad forests, where it occasionally attains a height of 50 feet before it forks. Leaves deciduous in the hot season, bipinnate, very large, reddish when young. Pod long-stalked, flat or strap-shaped, with a narrow wing on one side. The planters of Darjiling call this tree the red or pink cedar, and make their tea-boxes from it. In Coorg it is used for shingles; but its greatest utility is, perhaps, as a shade to coffee, for which it is well adapted and much prized. Planters in the Wynaad and elsewhere gladly pay Rs. 3 per lb. for the seed.

Mr. Graham Anderson writes of the species in the following terms:—

"One of the most lofty and elegant trees in the forest, which affords excellent shade, and is readily propagated by seed. In uncleared jungle seedlings are frequently found in profusion. Millions of young plants have been planted throughout Mysore within the last few years. The timber, usually, is said to be light—weight 39 lb. per cubic foot—and straight-grained. Some trees split splendidly into shingles, but others are found totally unfit for that purpose." This fine tree has recently been introduced for cultivation at Bangalore, and fairly good specimens may be seen at the Lal-Bagh and in the Cubbon Park, although poor in comparison to the magnificent growth of the Malnad. It will be observed from the foregoing remarks that the species is self-productive.

243 **Acacia farnesiana,** WILLD. *Kan.* Kasturi jali, Kasturi gobli.

Fig.—*Bedd. Fl. Sylv. t. 52. Wight Ic. t. 300.*

References.—*Fl. of Brit. Ind.*; *Dict. of Econ. Prod. of Ind.*

Common on the plains of Mysore. Usually seen as a thorny shrub, but in favorable situations attaining the size of a small tree. The bright yellow, puff-ball, flower heads diffuse a pleasant odour, and provide the chief ingredients of the manufactured perfume known as *Cassie.* Sown in drills, and periodically pruned when the seedlings attain size, the *Jali* makes a pretty fence, and being obnoxious to snakes, and vermin generally, it might be utilised with advantage as a garden hedge.

Wood white, hard and tough but too small for general utility. Weight 49 lb. per cubic foot. The stem affords a useful gum, and the bark and pods are included among native drugs.

Easily produced from seed. There is a specimen in the Lal-Bagh, presented by a clergyman, which was brought from the city of Jerusalem.

244 Acacia arabica, WILLD. *Kan.* Kari Jali, Gobli.

Fig.—*Bedd. Fl. Sylv. t. 47.*

References.—*Dict. of Econ. Prod. of Ind.*; *Drury U. Pl.*

A small or medium sized tree of the plains and inland dry tracts. Thorny and evergreen. Flower heads yellow. Pod torulose. The *babool* of India. Common throughout the maidan districts of Mysore, where every part of the tree affords some useful property. Of arborescent species this is the hardiest and perhaps the best known in Hindustan. It grows on the poorest soils and in the least watered tracts where other trees usually succumb.

Wood pale red, turning darker on exposure, close-grained, tough, and, when seasoned in water, very durable. Weight about 54 lb. per cubic foot. Used extensively for naves, spokes and felloes of wheels;

also for rice pounders, oil and sugar mills, agricultural implements and even buildings when large timber is procurable. But in addition to its great hardihood, and general utility as a small timber and fuel tree, the species affords Indian gum arabic, tan, dye, fibre, food and medicine. Extensively planted in fuel plantations where it coppices well and is reproductive from seed. The tender pods and leaves are much relished by all sorts of cattle. The tree flowers early in the hot season and produces ripe seed in August.

Cultivation.—Although hardy enough to exist and make some growth in the poorest soils, it is assumed that *Jali* succeeds best in a black cotton soil. For the growth of fuel the seedlings should be planted at about 8 feet apart, permanent saplings being eventually left at 16 feet apart. Beddome found that rats are very partial to the tender roots of seedlings.

245 Acacia leucophlæa, WILLD. *Kan.* Bili jali, Topal, Beala, Tumbe.

Fig.—*Bedd. Fl. Sylv. t. 48.*

References.—*Fl. of Brit. Ind.; Dict. of Econ. Prod. of Ind.; Drury U. Pl.*

A large, deciduous tree, with numerous white prickles, and light grey to whitish bark. Common in fields and waste places, especially in central and east Mysore, where it sometimes covers many acres of land almost to the exclusion of other trees. Of globose-flowered *Acacias*, this species is easily determined by its paniculate inflorescence. Sapwood predominating, heartwood dark, tough, easily seasoned and susceptible of a fine polish. Weight about 55 lb. per cubic foot. A capital fuel tree and very productive from coppice. Bark used in distilling arrack, the tannin in it precipitating the albuminous matter in the juice. Brandis says " the young pods

are used as vegetables," but they do not appear to be so used in Mysore although cattle are exceedingly fond of them and their consumption by sheep is supposed to improve the quality of mutton. Gum, dye, fibre and medicine, are additional products of this well-known tree.

Cultivation.—*Bili jali* grows much faster than *Kari jali* and is therefore more productive of fuel. Coppiced trees repeat growth very rapidly and are therefore invaluable for fuel plantations. Seeds also germinate freely, but steeping in water, or fermenting for a time in dung or litter, will facilitate the process. Plant seedlings at 10 feet apart and thin out every alternate sapling eventually. The softening of the cuticle in hard seeds is a very important operation, as otherwise such seeds are exposed to the attacks of insects, and the vicissitudes of treatment or the weather for a long period.

246 Acacia Suma, KURZ. *Kan.* Mugali, Mugli.

Fig.—*Bot. Plates Lal-Bagh Collection. Bedd. Fl. Sylv. t. 49.*

References.—*Brand. For. Fl.*; *Dict. of Econ. Prod. of Ind.*

A deciduous tree affecting moist land in the vicinity of tanks, nullahs and streams. Conspicuous by its white bark and the whitish down covering the young shoots and petioles. The above characters are most pronounced at the close of the hot season when the tree bursts into leaf and flower. Flowers spicate, dull white. Common in central and east Mysore. The *Mugali* is a good fuel tree, but is of minor utility otherwise. The gum is not collected here in lieu of catechu. It is an excellent subject for scenic planting about ponds and in wet land as it stands out in bright relief from the usual sombre green of other trees.

Cultivation.—Easily propagated from seed, and attaining the largest growth in moist situations near tanks and rivers. Coppices well.

247 **Acacia catechu,** WILLD. *Kan.* Kagli, Kachu, Tara, Tere.

Fig.—*Bot. Plates Lal-Bagh Collection.*

References.—*Dict. of Econ. Prod. of Ind.*; *Brand. For. Fl.*

A deciduous tree growing throughout the maidan, and on the outskirts of the Malnad proper. In the stony-hill tracts it is often reduced to the size of a large bush; but otherwise it is a tree of compact growth and medium size rarely exceeding 50 feet in the best situations.

Sapwood yellowish-white; heartwood dark red, hard, durable, seasons well and takes a fine polish; not subject to the attacks of white ants. Weight 60—70 lb. per cubic foot. Extensively used for fuel and charcoal, which is regrettable considering the superior quality of the timber. Also used for agricultural implements, oil mills, sugar-cane crushers, bows, and handles to native arms.

Catechu, or cutch, the most important product of the tree, is obtained by boiling down a decoction afforded by the chips of the heartwood. "Acacia catechu for use with *pan-supari* is largely prepared about Surat. Value Rs. 20 per maund of 37½ lbs. Cutch fetches from Rs. 4 to 5 per maund, and is prepared in many parts of India by wild forest tribes." *Pharmacographia Indica.*

Catechu is not extensively made in this province, although it is in general use for masticatory, medicinal and industrial purposes. There are two kinds, the dark and pale, of which the latter only is used for chewing. The tree is easily propagated from seed, and coppices well. It is much too valuable to be cut down for fuel.

248 Acacia sundra, DC. *Kan.* Kempu khairada?

Fig.—*Bedd. Fl. Sylv. t. 50.*

References.—*Fl. of Brit. Ind.*; *Dict. of Econ. Prod. of Ind.*

This is probably a variety of *A. Catechu*, as it possesses nearly the same properties and only differs in colour and a few minor technicalities of structure. The branchlets are of a very dark-brown or reddish colour. The wood is also said to be heavier and more durable than in the preceding species.

249 Acacia ferruginea, DC. *Kan.* Banni.

Fig.—*Bedd. Fl. Sylv. t. 51.*

References.—*Gamb. Man. Timb.*; *Dict. of Econ. Prod. of Ind.*; *Brand. For. Fl. p. 185.*

A large tree with a brownish bark. Leaves deciduous at the close of the cold season. Common in dry jungles in East Mysore, while in Shimoga and other parts of the Malnad it is confined to open spaces skirting the evergreen zone. Being a sacred tree the timber is seldom used. "It is said in *Mahabharata* that *Arjuna* had placed his gandiva or bow on this tree before he went away in disguise to serve under *Virata*. On the tenth day of *Dasara* this tree is worshipped by the Hindu Rajas. It has medicinal properties and yields a gum." *M. Venkatnarnappa.*

Heartwood small in proportion, reddish brown, and said to be fairly durable. Weight 70 lb. per cubic foot. Bark very astringent and used, like the bark of *A. leucophlæa*, in distilling arrack. The tree flowers in April and ripens seed in June or July. A well-known species.

Cultivation.—Self-productive where the surface soil is favorable as regards looseness and moisture. When seedlings are 4 inches high they should be collected for nursery treatment in baskets or tile-

pots. In this way they are usually ready for final planting within 12—15 months. Growth is very slow except in rich soils of a porous nature. The tree coppices fairly well.

250 **Acacia Latronum,** WILLD. *Kan.* Donn-mullina-jali, Hote jali ?

Fig.—*Bedd, Fl. Sylv. t. 95. Wight Ic. t. 1157.*

This species should be found on the confines of the Malnad. It is a low tree assuming the form of an umbrella. Wood prized for tent pegs.

251 **Acacia concinna,** DC. *Kan.* Cige, Sige.

Fig.—*Bot. Plates Lal-Bagh Collection.*

References.—*Dict. of Econ. Prod. of Ind.*; *Pharm. Ind.*

An intensely thorny climber found abundantly all over the Mysore country. Often forming a part of the village protective fence. The pods are used in lieu of soap, especially for washing the head; but they should not be confounded with the true soap-nut,—*Kugati kayi*—which is the fruit of *Sapindus trifoliatus.* The pods have a marketable value and their uses are described as under :—

"A popular household remedy for promoting the growth of hair and removing dandriff from the scalp, a decoction of pods (½ an ounce to the pint of water) being used as a hair-wash. In small doses the pods act as a tonic, but in large and repeated doses they have purgative and emetic properties assigned to them." *Surgn. Major F. M. Houston, Travancore*; *and John Gomes, Medical Store-keeper, Trivandrum.*

A. Intsia, Willd. and *A. pennata,* Willd. are hill climbers somewhat similar to the above, but apparently less useful.

The introduced Australian trees *Acacia melanoxylon,* R. Br. and *A. dealbata,* Link., are sparsely cultivated in the coffee districts and at Nundydroog.

These, as also the Australian "black wattle," *Acacia decurrens*, Willd. could, if necessary, be cultivated on the Baba Budan hills.

252 **Albizzia Lebbek**, BENTH. *Kan.* Bage, Bagi, Hombage, Tirchul.

Fig.—*Bedd. Fl. Sylv. t. 53.*

References.—*Fl. of Brit. Ind.; Dict. of Econ. Prod. of Ind.; Drury U. Pl.*

The Siris tree. A large species found in all parts of the province, but attaining its greatest size in the west of Mysore. Often planted as an avenue tree, but not well adapted for the purpose as it remains bare of leaf for a long season. It flowers profusely in March and April and is then a striking object, the prevailing colours being straw, pale yellow and purplish green. Sapwood rather abundant; heartwood reddish to dark reddish brown with darker streaks. Takes a good polish and is generally considered a fairly durable timber; it is not utilised to any great extent, however, as in most parts of Mysore it is considered unlucky to employ the wood for house building and domestic purposes. But Lovery says it is used in Shimoga for buildings, furniture, carts and oil mills. Weight 50—60 lb. per cubic foot. Cattle eat the green leaves of the tree greedily, and it is said to be cultivated in some parts to provide forage. Medicinal properties are attributed to the bark, leaves, and flowers; the latter being considered very cooling, are popularly applied to ulcers, boils and swellings.

Cultivation.—The *Bage* is a self-productive tree, but squirrels, rats and other vermin, are so fond of the seeds that few are left for natural production. Under protection the seeds germinate very readily, but it is doubtful if such seedlings ever attain the vigorous growth of the self-sown ones.

The species affects a warm moist situation as in the maidan valleys lying nearest to the Malnad.

For permanent growth, plant at 30 to 35 feet apart.

253 **Albizzia odoratissima,** BENTH. *Kan.* Bilivara, Bilwara, Bilvarada.

Fig.—*Bot. Plates Lal-Bagh Collection. Bedd. Fl. Sylv. t. 54.*

References.—*Gamb. Man. Timb.; Brand. For. Fl.; Dict. of Econ. Prod. of Ind.*

This is commonly known as the raiyat's tree. A tall erect tree, attaining in good situations to 80 feet, with an unforked trunk of 30—40 feet. Leaves deciduous in March and April. Flowers succeeding the young leaves in June, in ample terminal panicles, greenish-white, apricot-scented.

Plentiful in the forests of Western Mysore and Coorg. Cultivated in the east and more or less self-sown nearly all over the country. Heartwood rich brown, tough and strong; seasons well, takes a good polish and is durable when kept dry. Weight 50—55 lb. per cubic foot. Of indigenous trees, this is one of the best to coppice for fuel, while the seasoned timber is of a kind that lends itself to nearly every domestic purpose. It is largely used for buildings, agricultural implements, oil and cane mills, naves of wheels and such like. The bark has medicinal properties and the green leaves are nibbled by cattle. This is, altogether, a most useful tree, and one that should be encouraged.

Cultivation.—In the neighbourhood of Bangalore it is difficult to obtain good seed, from the fact that the latter is largely consumed in the pod by small maggots, and perhaps other insects too. On this account local sowings are not very productive, while, as with the *Bage*, self-sown seedlings are always the strongest. Topes of ***Bilivara*** should be raised in the vicinity of every important village, the trees being planted and cared for by the village authorities in

consideration of some trifling concession from Government. Plant in large pits at 25—30 feet apart. Ploughing the land at the time of seed-shedding will be productive of seedlings.

254 Albiziza procera, BENTH. *Kan*, Chikul? *Tam.* Konda Vaghe.

References.—*Bedd. Fl. Sylv. 95. Dict. of Econ. Prod. of Ind.*

The Tamil people call this immense tree the hill *Vaghe (Kan. Bage)*, but it is a distinct species occupying comparatively high altitudes. Leaves deciduous in the cold season. Common on both the Eastern and Western Gháts of the Madras Presidency, where Beddome describes it as a magnificient tree. Wood noted for the preparation of charcoal, but said to be inferior otherwise. Should be searched for on the south-west boundary of the province. Seedlings spring up freely in the forests and the tree coppices.

255 Albizzia Julibrissin, DURAZZ.

A deciduous unarmed tree of the Western Gháts. Cultivated in the Botanical Gardens. Flowers rosy-red and sweetly fragrant. The heartwood, which is very dark when seasoned, is said to be sufficiently durable for articles of furniture.

256 Albizzia stipulata, BOIV. *Kan.* Hotte bage, Kal baghi. In Coorg, Kote pale.

Fig.—*Bedd. Fl. Sylv. t. 55. Bot. Plates Lal-Bagh Collection.*

Reference.—*Dict. of Econ. Prod. of Ind.*

A large tree of the Malnad and Coorg. Leaves deciduous for nearly a month during the hot season. The exceptionally large stipules found on the young shoots characterise the species, which is also remarkable for its rapid growth. Wood used for various purposes, although it is not very durable; excellent charcoal is made from it. Weight 35—45 lb. per cubic

foot. The green leaves are browsed upon by cattle. This tree might be tried as a shade for coffee cultivation, as tea is said to flourish well under it in Assam. It is highly ornamental, especially in the month of June, when the straw coloured flowers are very attractive.

Cultivation.—Raise from seed and plant in loose soil at not less than 35 feet apart. Excepting that it drops its leaves during the warmest season of the year, it is a good avenue tree.

257 **Albizzia amara**, BOIV. *Kan.* Chugalu, Sujjalu, Bilkambi. In Coorg, Kadsige.

Fig.—*Bedd. Fl. Sylv. t. 61.*

References.—*Fl. of Brit. Ind.; Dict. of Econ. Prod. of Ind.*

A medium-sized deciduous tree. Branchlets and leaf rachis densely pubescent; leaflets very narrow, with a central midrib. Not uncommon in the reserved forests where it is often felled with other trees for locomotive fuel. Abundant in Kadur and Shimoga. "A deciduous tree with purplish brown heartwood, the transverse strength of which is unsurpassed by any wood. It is hard and durable and can be used for carts and agricultural implements."
M. Venkatnarnappa.

Although rather small in Mysore, this wood is exceptionally durable. Weight 62—70 lb. per cubic foot. Seasoned limbs of the proper size are not uncommonly used by the raiyats as ploughs.

Cultivation.—Easily raised from seed. Growth moderately quick where the soil is deep and porous. Plant in August.

258 **Pithecolobium dulce**, BENTH. *Kan.* Sime hunase, *Tam.* Korkapille.

Fig.—*Bedd. Fl. Sylv. t. 188. Wight Ic. t. 198.*

References.—*Drury U. Pl.; Dict. of Econ. Prod. of Ind.*

The Manilla tamarind tree. This well known species is a native of South America; naturalised in India and other eastern countries. Extensively cultivated as a fuel tree and as a fence around fields and gardens. In the latter capacity it is a familiar object, and when properly trimmed, from the beginning, the *Korkapille* makes a very pretty hedge. Goats, however, are so fond of the tender foliage that they often commit considerable damage to the roadside fences. Under favorable circumstances it grows into a pretty large tree, which coppices well and affords good fuel. "Sapwood small; heartwood reddish brown, not heavy, 40 lb. per cubic foot, smells unpleasantly when fresh sawn, used for various purposes." *Brandis.*

The sweet pulpy aril which encloses the seed is eaten by children, and the seed itself contains a valuable oil.

Cultivation.—Growth is most luxuriant near the sea and by the sides of canals and rivers. To form a hedge, the best plan is to sow the seed in a prepared trench or furrow, during the rains. The seedlings will then only require to be watered occasionally during dry weather, and preserved from goats and cattle. The *sime hunase* is very self-productive in plantations and by the sides of fences, but the seedlings quickly form a long tap-root, and unless they are removed at a very early stage of growth the operation becomes difficult and even impracticable. The tree coppices well, and affords locomotive fuel of a fair quality. Grown for the latter, it may be planted at 6 feet apart and eventually thinned to 12 feet. A soil of some depth is necessary for the best growth, but it should neither be water-logged nor too hard.

259 Pithecolobium bigeminum, Benth.

References.—*Bedd. Fl. Sylv. 96. Dict. of Econ. Prod. of Ind.*

Beddome says this is a common tree of the western forests of the Madras Presidency up to 4,000 feet. It no doubt extends into Mysore also, although it has not found a place in the lists prepared by local forest officers. A large soft-wooded tree. Deciduous or subdeciduous for a short season. *P. subcoriaceum*, Thwaites, may also be found on the western hills of the province.

260 Pithecolobium Saman, MART.

Fig.—*Bot. Plates Lal-Bagh Collection.*

The rain tree. Introduced from South America and grown experimentally at various centres. Of large trees it is one of the quickest growth, the dimensions attained in the course of 6—8 years being truly marvellous. The species was first introduced to Bangalore in 1878, and during the past two or three years many thousands of seedlings have been raised and distributed from the original trees. But the wood is soft and fibrous as nearly always happens in cases of rapid development. The real value of the species will depend on the ready shelter it affords to more delicate plants at an early stage of growth, on its capacity to act as a nurse and on the nutritious value of its leaves and fruit as a food for cattle; of the latter utility there is no question, as both the leaves and fruit are greedily consumed by horses and other live-stock. The following analysis by Mr. Hooper of Ootacamund, shews clearly how rich the pods are in food material :—

	Dried pods of Pithecolobium Saman.
Water	...
Albuminoids	11·7
Sugar & Carbohydrates ...	66·9
Fat	3·7
Fibre	13·3
Ash	4·4
	100·0

Hooper.

Another important function of the rain tree is its capability to raise, and thereby improve marshy land. This it does by a rapid development of large surface roots which uniformly rise to a higher level as the tree advances in growth. The sensitive leaflets close together on the approach of darkness and re-open with the rising sun, the rather sudden displacement of accumulated dew caused by the latter movement, occasionally amounting to a slight drizzle, may have given rise to the appellation 'rain tree.' Or it may be that, occupying extensive tracts of country, this tree, by its vigorous growth and peculiar leaf-formation, exercises an exceptional influence on the rain clouds.

Cultivation.—Seed will germinate very freely when sown in pans or in prepared nursery beds. A good avenue tree, except that the upper roots have a tendency to throw up the soil and raise a mound. The wide-spreading limbs are also subject to damage from high winds. Should be planted in village topes to provide fodder for cattle.

261 Castanospermum australe, A. CUNN.

Fig.—*Bot. Plates Lal-Bagh Collection.*

The Moreton Bay chesnut. This handsome evergreen tree is cultivated in the cities of Bangalore and Mysore; it is also found at intervals in the coffee districts, and in the town of Mercara. It is generally known by its large orange-crimson flowers, produced in clusters upon the matured wood behind the leaves. The road leading in to the Cubbon Park from the Sampangi tank is shaded by an avenue of Moreton Bay chesnuts. But the latter have not grown to a large size, although they are down for nearly 20 years. The boat-shaped fruit—containing 2—4 seeds the size of a marble—is an object of attraction to children. Many seedlings are annually raised for distribution.

262 Hæmatoxylon campechianum, LINN.

The American logwood tree. This has been cultivated in the Botanical Gardens for many years, where, however, it only attains to the size of a scandent bush or small tree. The red-coloured heartwood affords a well known dye, or rather a series of dyes of the darker tints such as grey, violet, blue, and even black. Logwood does not coppice, but it bears a lot of pruning, makes a durable fence and grows fairly well from seed. The species will become naturalised in this country eventually. It should be included in garden shrubberies, as the racemed, yellow flowers are both showy and sweetly scented.

263 Colvillea racemosa, BOJ. This grand tree was introduced by the writer in 1880 and there are now several good specimens in local cultivation. The best one is on the lower terrace in front of the exhibition building in the Botanical Gardens, where it flowers profusely in the month of September. The foliage resembles that of the 'gold mohur' tree, for which the species might readily be mistaken when undersized and not in blossom. But the *Colvillea racemosa* is a lofty evergreen tree which flowers at the close of the south-west monsoon. The inflorescence consists of a terminal, drooping panicle, or compound raceme of rich golden flowers supported on reddish calyces. As an ornamental tree of moderately rapid growth, this species has few equals; and when seedlings become plentiful it will spread quickly and become a prominent feature in local vegetation. Avenues of the tree would have a splendid effect. Propagate from seed, and plant in loose soil at 35 feet apart.

264 Ceratonia siliqua, LINN.

The carob-bean tree. Also known by the popular names of "St. John's bread," "Locust tree" and "Algaroba." A small evergreen tree of Spain,

Portugal and other parts of south-east Europe. The Duke of Wellington foraged his horses on the fruit and leaves of the tree during the great Peninsula war. It has been cultivated in the Lal-Bagh for 30 years, and is fairly productive of fruit. A great many seedlings have been issued from the Botanical Gardens during the past decade, and from these and other sources the species is now well established in various parts of India. One male tree is sufficient to fertilise 50 trees of the opposite sex, the operation being mostly conducted by a host of small insects. At Bangalore the carob-tree succeeds best in an open loam with good sub-soil drainage. Plant at 15 feet apart. Professor Church gives the following analysis of the carob bean :—

	Carob beans. Ceratonia siliqua.
Water	14·6
Albuminoids	7·1
Sugar & Carbohydrates ...	67·9
Fat	1·1
Fibre	6·4
Ash	2·9
	100·0 *Church.*

XXX. ROSACEÆ.

265 Eriobotrya japonica, Lindl. *Kan.* Lakote.

Fig.—*Wight Ic. t. 226.*

Reference.—*Dict. of Econ. Prod. of Ind.*

The loquat tree. A small evergreen tree confined to garden cultivation, and not very popular in Mysore. The fruit, of which there are several varieties, makes an excellent preserve, and two local kinds, the large oval and small round, are also fit for dessert. It is commonly known as the "loquat" and "Japanese medlar." Inarching may possibly improve the size and flavour of this fruit.

Cultivation.—The tree is easily propagated from seeds, grafts and layers. Inarching or grafting induces early fertility and improves the quality of the fruit. If two seedlings are planted together in one pit, during the rainy season, they can be conveniently inarched in the subsequent warm season. The loquat tree is rather a gross feeder, and to secure the finest crops of fruit it needs a rich garden soil with occasional top-dressing of good farm-yard manure. The fruit ripens in August and September. Put out seedlings or grafts in August at 20—25 feet apart. The pits should not be less than 3 feet cubes.

Several fruit trees of the *Rosaceæ* are profitably cultivated at Bangalore and large quantities of fruit are exported to Madras, Poona and elsewhere. These consist mostly of—

266 Pyrus Malus, Linn. *Kan.* Sevu. The Apple.

267 Pyrus communis, Linn. The Pear.

268 Prunus Persica, Benth. The Peach.

269 Prunus communis, Huds. The Plum.

And the "Indian Raspberry" *Rubus lasiocarpus*, Smith.

XXXI. COMBRETACEÆ.

270 Terminalia Catappa, Linn. *Kan.* Badami.

Fig.—*Bot. Plates Lal-Bagh Collection; Bedd. Fl. Sylv. t. 18; Bot. Mog. 3,004.*

References.—*Fl. of Brit. Ind.; Dict. of Econ. Prod. of Ind.*

The Indian almond tree. A handsome species which throws out its branches in horizontal tiers, (whorls) so that the whole tree resembles a huge chandelier. Much cultivated in gardens and as a roadside tree, but not considered to be truly wild in any part of Southern India. In losing its leaves, it

assumes some of the autumnal tints which are so much admired in northern countries. The large, simple, obovate leaves are borne in clusters at the tips of the branchlets. Bare of leaf in December and January.

"It makes a good avenue tree, and is well worthy of extended cultivation. The wood is light but tolerably durable and is used for various purposes, and the leaves of pakottahs are often made of it; the kernels of the nuts are eaten and are very palatable; the oil expressed from the seed is very like almond oil, and the oilcake is used to feed pigs; the bark and leaves yield a black pigment with which the natives colour their teeth, and make into Indian ink." *Beddome.*

Cultivation.—Scattered seeds only germinate well in a hot-bed; but placed in little heaps they sprout satisfactorily without artificial heat. Comparatively loose soil, or an old well recently filled up, provides the best situation for this tree, although when large pits are made it succeeds in any soil of good or even average quality.

271 Terminalia belerica, Roxb. *Kan.* Tare, Tari.

Fig.—*Bedd. Fl. Sylv. t. 19; Wight Ic. t. 91.*

References.—*Brandis For. Fl.; Fl. of Brit. Ind.; Pharm. Ind.*

The Beleric myrobalan. A large deciduous tree of which the "Flora of British India" gives three distinct varieties, determined mostly by the morphology of the leaf, absence or presence of glands, and the size and form of the fruit. Attaining to 80 feet in good situations and always umbrageous. Plentiful in the mixed zone, as also in the hilly region of the dry zone of Mysore and Coorg. While in flower in the beginning of the hot season, the tree emits a very stercoraceous odour. It is the abode of *Sani*—Saturn—God of misfortune. Hindus are forbidden to use the

wood for building, nor should they sit under the shade of this tree. In Northern India the species is avoided by Hindus on the plea that it is infested by demons, an opinion which is not confined to the north, as M. Venkatnarnappa writes from Shimoga that "the wood of the tree is not much used on account of the superstitious idea that it is one of the favourites of *Saniswara*." Young foliage reddish-bronze in colour, subsequently changing to green and then very dense. Wood yellowish, soft but tolerably close-grained, made more durable by steeping for a time in water. Weight 40—43 lb. per cubic foot. The trunk attains a large size and is well adapted for making single-log canoes. "The fruit is a favourite of monkeys, deer, sheep, goats and cattle. It is one of the myrobalans of commerce, and is used in dyeing cloth and leather, and in tanning, and is exported to Europe. Native ink is made of it and it is used in medicine. The kernels are eaten, but are said to be intoxicating. Oil is expressed from them." *Brandis.* Graham Anderson has also recorded that the kernels cause giddiness when eaten. Myrobalans are a minor product of the State forests. The gum which exudes from the bark of the tree is occasionally utilised as 'country gum.'

Cultivation.—Raise nursery stock from seed, layers, and Chinese grafts. Sturdy plants thus prepared in one season should be ready for planting out in August of the following year, but it is immaterial if the seedlings are one or two years old providing that they are strong and movable. Plant in alluvial soils or in sandy loam at 45 to 50 feet apart.

272 Terminalia Chebula, RETZ. *Kan.* Alale, Alalee, Arale.

Fig.—*Bedd. Fl. Sylv. t. 27.*

References.—*Brand. For. Fl.; Pharm. Ind.; Fl. of Brit. Ind.*

The Chebulic or black myrobalan tree. A deciduous species of moderate size, of which there are several varieties. Abundant in and around the large deciduous forests of the table land, and on the outskirts of the Malnad. The gall nuts for which this tree is noted are found on the young leaves and tender shoots and have no connection with the fruit. "Roxburgh states that the tender leaves, while scarce unfolded, are said to be punctured by an insect and its eggs deposited therein, which by the extravasation of the sap, become enlarged into hollow galls of various shapes and sizes, but rarely exceeding an inch in diameter. They are powerfully astringent and make as good ink as oak galls. They also yield the chintz painters on the coast of Coromandal their best and most durable yellow." *Pharmacographia Indica.*

The fruit, when dried, is the black myrobalan of commerce. This product is farmed out annually or for longer periods in Mysore. Anderson states that, in Manjarabad, the juice of the fruit is applied to the feet to prevent chilblains during the monsoon. Heartwood dark brown when seasoned, finely mottled, hard and fairly durable. Weight 53—66 lb. per cubic foot. In Shimoga the wood is used by the raiyats for building furniture, carts and agricultural implements. "The Flora of British India" enumerates six varieties of this tree.

Cultivation.—The same as for the preceding species.

273 Terminalia citrina, Roxb.

A deciduous tree cultivated in the Botanical Gardens. Probably not indigenous to this State. The species attains to a large size in Assam, Burma and Tenasserim.

274 Terminalia Arjuna, Bedd. *Kan.* Bilimatti, Toramatti, Kamatti.

Fig.—*Bedd. Fl. Sylv. t. 28.*

References.—*Brand. For. Fl.*; *Pharm. Ind.*; *Fl. of Brit. Ind.*

A large tree of the Malnad. Characterised by wide spreading buttresses at the base of the trunk. Leaves deciduous during the hot season. Graham Anderson offers the following remarks under the name *Terminalia tomentosa,* which would seem to correctly apply to this species:—"It is a tree often left in coffee estates but is a wretched shader being completely bare for a considerable portion of the hot weather. It is a great lime feeder and the natives burn it to obtain eating chunam, which is said to be very pungent. The larva and perfect fly of the coffee borer have been found under the bark of this tree."

Wood dark brown, hard, difficult to work but susceptible of a fine polish. Seldom used in this province, Weight 48—54 lb. per cubic foot.

"Hindu physicians think that the bark has some special virtue in promoting the union of fractures, and the dispersion of ecchymosis when given internally. It is considered to be *Asmari-hara,* or lithontriptic and a reference to the chemical composition will show that the ash of the bark contains an extraordinarily large proportion of calcium carbonate. Externally it is used in the form of an astringent wash to ulcers." *Pharmacographia Indica.*

M. Venkatnarnappa also mentions that the bark is used medicinally. Possibly it is of more local value than has been realised.

275 Terminalia tomentosa, BEDD. *Kan.* Matti, Kari matti, Heb huluve.

Fig.—*Wight Ic. t. 195.*

References.—*Brand. For. Fl.*; *Pharm. Ind.*; *Fl. of Brit. Ind.*

A deciduous tree of the Malnad and elsewhere. Often attaining a great size and forming a fine clean

trunk, but small and crooked in the drier Taluks. Magnificient specimens are found in the reserved forests of the Malnad, although the majority of them are said to be more or less hollow in the trunk. Flowers in terminal panicles, whitish or pale yellow, "often attacked by a cynips producing numerous galls which simulate fruit." *Fl. of Brit. Ind.*

Wood dark brown, with darker streaks, hard, but not very durable. Weight 50—70 lb. per cubic foot. Although the wood does not season well, and is apt to split, still it is extensively employed, and fetches a good price in the timber market. It is an excellent fuel tree, and when the hill forests have been tapped by one or two loop lines of railway it will afford large quantities of the finest locomotive fuel.

The leaves are prized as manure for the areca-nut gardens, and in north-west Mysore the trees are heavily pollarded on that account. When the hill people bathe in oil they afterwards employ *Matti* leaves to clean their bodies, first soaking the leaves for a time in warm water. A mucilaginous substance obtained from the soaked leaves, by pressure, is taken internally, after a hot bath, to cool the system. It is mixed, in some proportion, with jaggery and cardamom powder, and swallowed soon after the bath. The bark is locally used for tanning, and Anderson, Lovery and others, assert that a pungent lime is obtained from it, a statement which requires verification, as in *Pharmacographia Indica* the lime properties are attributed to *Terminalia Arjuna*, while the species under notice is not mentioned in the above work. There are also three distinct varieties of the species which may or may not possess properties of a uniform nature.

Cultivation.—The *Matti* affects a moist deep soil, consisting of clay or virgin forest land, where the rainfall ranges from 75 to 100 inches per annum. It attains its largest dimensions in the valleys of the

Malnad. Propagate from seed. The fruit has five regular wings.

276 Terminalia paniculata, Roth. *Kan.* Hulve, Huluve, Hunal, Hoonal.

Fig.—*Bedd. Fl. Sylv. t. 20.*

References.—*Brand. For. Fl. ; Fl. of Brit. Ind.*

A large deciduous tree. Common in Shimoga and throughout Western Mysore, below the Ghâts. Timber of middling quality, especially when seasoned in water. Heartwood dark, hard, and fairly durable. Weight 47 lb. per cubic foot. Commonly applied to the same local uses as *Matti*, and affording useful fuel ; makes good planking and is popular for building country carts. Lovery remarks that it is subject to the attacks of white ants, when buried in the ground.

Cultivation.—This species requires deep loam containing plenty of moisture. As it projects into the dry zone it becomes stunted in growth and irregular in form. Propagate from seed and plant out in the following season. Observe the fruit having one fully developed wing and two abortive ones.

The genus *Terminalia* is rich in timber and minor products ; but the variation in species is somewhat conflicting, and gives rise, no doubt, to such vernacular names as *Permatti* and *Chittu huluve*, which are not accounted for under the specific headings. The best trees are in somewhat inaccessible situations, but as the railway advances into the hill region they will afford a small mine of wealth.

277 Anogeissus latifolia, Wall. *Kan.* Dindiga, Dindlu, Dindal, Bejalu.

Fig.—*Bedd. Fl. Sylv. t. 15. Wight Ic. t. 994.*

References.—*Dict. of Econ. Prod. of Ind.; Brand. For. Fl.; Drury U. Pl.*

A deciduous tree. Common throughout Mysore east of the Ghâts. In the extensive forests skirting

the hills it attains a large size, but gradually becomes smaller as it extends into the drier eastern region. *Dindiga* is generally looked upon as a useful timber, although in exposed and heavy works it is not durable. As a fuel and charcoal tree, it is one of the best in the province. Sapwood predominating, yellow; heartwood small, purplish-brown, tough, elastic, and very hard: but it warps and splits in seasoning, and requires to be kept quite dry to last. Weight 62—65 lb. per cubic foot. The gum, which exudes from the bark copiously, is used by calico-printers to mix with certain dye stuffs and is commercially the most important product of the tree. The green leaves are rich in tannic acid and are employed by the local chucklers to tan raw hides.

This utility of the leaf deserves every encouragement, as by a proper system of thinning the supply of leaves from the State forests would practically become inexhaustible. The three varieties of the species enumerated by the " Flora of British India," are mostly determinable from each other by the size, form, and texture of the leaf.

Cultivation.—As regards size, it has been said that the moist valleys skirting the Western Gháts, and mostly composed of a rich alluvial soil, afford the best situation. But on the other hand the smaller tree of the eastern maidan region, growing in a poorer soil and sparingly watered, is superior in quality, the wood being harder, the gum more abundant, and the leaf richer in tannic acid. Although not very productive from seed, the *Dindiga* throws up numerous offsets and suckers which replace the parent trunk.

278 Anogeissus acuminata, WALL.

This species should be found on the northern frontier. It is a large or small tree according to position and variety, of which latter there are several.

279 Calycopteris floribunda, LAMK. *Kan.* Marsada-boli—The Hassan name.

A large climbing shrub, the leaves, root, and fruit of which are used medicinally.

XXXII. MYRTACÆ.

280 Tristania conferta, R. BR.

Queensland box. Introduced from Eastern Australia and cultivated in the Lal-Bagh. "Diameter 35 to 50 inches; height 80 to 100 feet. A large spreading tree, with a smooth brown deciduous bark and dense foliage; very generally distributed in open forest ground. The timber is much prized for its strength and durable qualities. Market value from 8 *s.* to 9 *s.* per hundred feet. Used in ship-building; ribs of vessels from this tree have lasted unimpaired for thirty years and more." *Walter Hill.*

281 Eucalyptus marginata, SM. *The Jarrah.*

282 E. rostrata, F. MUELL. *The red gum.*

283 E. citriodora, HOOK. *The lemon-scented gum.*

These exotic trees are cultivated in the cities of Mysore and Bangalore, where they succeed tolerably well. But most of the Australian *Eucalypti*, including the "blue gum," *Eucalyptus globulus*, require higher and moister altitudes than Bangalore. Should it be necessary to cultivate the latter on an extensive scale, as at Ootacamund, the Baba Budan hills would probably afford the best site for the purpose. A number of species are under trial in the Botanical Gardens.

The *Eucalypti* are easily raised from seed, and seedlings transplant well during rainy days, when they are a foot to 15 inches in height.

284 Psidium guyava, LINN. *Kan.* Sibe, Shibe, Chepe, Pearlu.

Fig.—*Bot. Lal-Bagh Collection.*

References.—*Brand. For. Fl.*; *Fl. of Brit. Ind.*; *Dict. of Econ. Prod. of Ind.*

The guava tree. Strange though it may appear, this well known fruit tree is indigenous to tropical America and has only been naturalised in this country since the early conquest of the Portuguese.

Wood compact, close-grained, and takes a beautiful polish. Used for engraving, and for the handles of knives and instruments. The guava tree is universally cultivated for its fruit, of which there are three or four varieties. Of the latter the grafted forms are superior and command a good sale in the Indian fruit markets. The bark and leaves are medicinal.

Cultivation.—Propagate from seed, and when the seedlings are 2—3 feet high, with a moderately woody stem, place them in position under a good variety to be inarched. The latter operation done, remove to a cool shady spot for about a month, after which the grafts should be gradually removed to full exposure. Preparatory to inarching, the seedlings have to be conveniently and securely fixed among or around the branches of the old graft. This is done very often by raising little mounds of good soil in which the seedlings are planted, but it is more expeditious to have them deposited in baskets or tile-pots, as in the latter case the seedling receives no check and may be inarched on the same day that it is placed in position.

Inarching is best done in August and September, and the operation, from the time it is effected until the day of removal, usually extends over three to four months.

Grafted guava trees are planted at 15 feet apart, and to bear abundant crops of fruit they require good soil, good manure and plenty of water.

285 **Eugenia malaccensis,** Linn.

Fig.—*Wight Ill. ii. 14.*

A small evergreen tree cultivated in the Lal-Bagh, Very ornamental, having shining leaves, large crimson flowers, and beautiful fruit, the size and form of a goose's egg. The fruit is insipid.

286 **Eugenia Jambos,** Linn. *Kan.* Pannerale, *Coorg* Malle nerale.

Fig.—*Wight Ill. ii. 14. Wight Ic. t. 435.*

References.—*Dict. of Econ. Prod. of Ind.; Brand. For. Flora.*

The rose-apple tree. Evergreen, spreading (branching) from the base and of medium size. Cultivated for its fruit, which is of the size and form of a crab apple. Affects moist situations and is a good tree for scenic planting, being very effective in flower. The fruit has a delicate rose-water flavour, but on the other hand it is too dry and cottony to be in great demand. The tree produces two crops yearly. Wood of little value.

287 **Eugenia hemispherica,** Wight. *Kan.* Matta nerale, *Coorg* Makke nerale.

Fig.—*Wight Ic. t. 525. Bedd. Fl. Sylv. t. 203.*

References.—*Fl. of Brit. Ind.; Dict. of Econ. Prod. of Ind.*

A handsome evergreen tree confined to the Malnad and Coorg. Flowers large white; fruit one inch in diameter. The timber is said to be utilised for various purposes. Upper branchlets subtetragonous; leaves variable in form and texture.

288 **Eugenia læta,** Ham. A middling-sized tree of the hill forests. Flowers large when fully opened, petals whitish, stamens crimson. Fruit ovoid. Possibly confined to the wettest portion of the Ghâts. Uses unknown.

289 **Eugenia myrtifolia,** Roxb.

A shrub or small tree affording a strong dark-coloured wood. Cultivated in the Lal-Bagh.

290 **Eugenia zeylanica,** Wight. *Kan.* Kunnerale, Kunnerlu.

Fig.—*Wight Ill. ii. 15; Wight Ic. i. 73.*

References.—*Fl. of Brit. Ind.; Kurz. For. Fl. Burm.*

A small evergreen tree of Shimoga, Hassan, and the Western Ghâts. Locally used for fuel and manure, and, like *Neralé*, it possesses medicinal properties. Flowers and fruit white.

291 **Eugenia operculata,** Roxb.

Fig.—*Wight Ic. t. 552 & 615.*

References.—*Fl. of Brit. Ind.; Dict. of Econ. Prod of Ind.; Brand. For. Fl.*

A large tree of the Western Ghâts. Leaves turning bright red in decay. Flowers greenish. Fruit edible. Lovery reports that the wood is brown, close-grained, tough, and durable, and that the fruit is eaten. It is possible, however, that this remark applies to a variety of the next species, which is popularly known by the vernacular appellation *Nai nerale.*

We therefore require fuller information as to the identity of this tree.

292 **Eugenia Jambolana,** Lam. *Kan.* Nerale, Nerlu, Jumnerale, Nai nerale.

Fig.—*Wight Ic. t. 535; Bedd. Fl. Sylv. i. t. 197.*

References.—*Brand. For. Fl.; Pharm. Ind.; Fl. of Brit. Ind.; Dict. of Econ. Prod. of India.*

The black-plum tree of India. There are two distinct varieties of the species, *viz. caryophyllifolia,* (Nai nerale) the small roundish-fruited, and *obtusifolia,* (Jum nerale) the large oval-fruited. The latter is most abundant in the hill country, while the former

is more frequently found in the plains; both varieties are popularly known as the 'Jamoon,' and are extensively planted as avenue trees at the sides of the provincial roads. Being large, evergreen, or rarely subdeciduous trees, they are well adapted for the latter purpose. Wood whitish, changing to reddish brown in the heartwood, hard, tough, durable in water, and fairly lasting otherwise. Weight 45 lb. per cubic foot.

The wood of var. *obtusifolia*, is supposed to be somewhat superior to that of the other variety; but both are liable to warp in seasoning. Locally used for buildings, agricultural implements, and grinding mills, &c. Medicinal properties are attributed to the fruit, leaves, seeds, and bark; and the last named product affords material for dyeing and tanning. The fruit, which is very abundant in the rainy season, is sold in the bazaars and commonly eaten by all classes. Eaten in quantity, it is said to cause fever.

One variety of the *Jum nerale*, which is only found in certain localities, attains the size of a damson plum, and being produced in large clusters, is a very attractive fruit. When the berries are falling from the tree, the ground underneath is stained blue-black. M. Venkatnarnappa reports that "the tender portions (*sic*) dried and powdered constitute a very good substitute for coffee, though it does not possess the same properties."

Another substitute for this important beverage is prepared from the roasted seeds of *Cassia occidentalis*. *Kan.* Kol tagaci.

Cultivation.—The Jamoon is self-productive from seed, the latter being often favourably deposited by flying foxes, squirrels, and birds. In good soil, the tree attains a large size and is said to be a suitable shade for coffee cultivation. In such a position, full grown trees would occupy a diameter of 100 feet.

293 Eugenia floccosa, BEDD. *Kan.* Sime nerale.

A beautiful tree of the Western Ghâts. Should be utilised within its range for scenic purposes. It is figured and described in Beddome's Flora Sylvatica, page 200.

294 Eugenia Heyneana, WALL.

Fig.—*Wight Ill. ii. 16*; *Wight Ic. t. 539.*

A small tree, or occasionally not more than a shrub. Usually found in the beds of streams in Coorg and the Malnad. A variable species, of which specimens should be transmitted with fuller information.

This large genus, of which **131** species are enumerated by Mr. J. F. Duthie, in the Flora of British India, is fairly represented in the hill forests of Mysore. But few of the local trees have any commercial value, neither do they adapt themselves readily to the dry atmosphere of the plains. For general utility all over the country, the species *Jambos* and *Jambolana* are as well suited as they are widely known. But within the moist evergreen zone, many species of *Eugenia* are admirably adapted for ornamental effect.

295 Barringtonia speciosa, FORST.

Fig.—*Wight Ic. t. 547.*

An evergreen tree cultivated in the Botanical Gardens, and known to be of great scenic value. Introduced from Ceylon. It is doubtful if *B. acutangula*, Gærtn. is found in Mysore.

296 Careya arborea, ROXB. *Kan.* Gouju, Gavuldu, Kavalu, Kaval.

Fig.—*Bedd. Fl. Sylv. t. 205.*

References.—*Fl. of Brit. Ind.*; *Pharm. Ind.*; *Dict. of Econ. Prod. of Ind.*

A common deciduous tree. Small on the plains but attaining a large size as it approaches the moist region of the hills. In age, the large obovate

leaves assume a reddish autumnal tint, and subsequently fall when the rains subside.

Sapwood abundant, white; heartwood reddish brown to dull red, dark in old trees, even-grained and beautifully mottled. Weight 43—60 lb. per cubic foot. It is a durable and pretty wood, but except for wooden vessels and agricultural implements, it is seldom used in Mysore. It was formerly used for the drums of sepoy corps. In addition to its well known astringent properties, the bark affords a very strong fibre, which, with other uses, is employed as a slow match to ignite gunpowder, and in the preparation of fusees for native matchlocks.

Medicinal properties are attributed to the fruit and the calyces of the flowers. In size and form, the fruit is not unlike an English apple.

Cultivation.—Each fruit contains 10—18 seeds, which, if removed from their fleshy covering, and sown in pans, will germinate readily.

297 Couroupita guianensis, Aubl.

The cannon-ball tree. So called from the spherical shape of the fruit. This interesting tree grows well in the Lal-Bagh, where it sheds its leaves during the cold season. The large flowers are borne on the matured wood and are mostly red and orange in colour. The species has been introduced from St. Vincent.

XXXIII. MELASTOMACEÆ.

298 Memecylon edule, Roxb. *Kan.* Udatalli, Limbtoli.

Fig.—*Bot. Plates Lal-Bagh Collection. Wight Ill. t. 39.*

References.—*Flora of Brit. Ind.; Dict. of Econ. Prod. of Ind.*

An evergreen shrub or small tree of very variable character, there being no less than twelve varieties

of the species enumerated in the "Flora of British India."

It possesses a hard wood, which has, in the Hassan District especially, a good reputation for durability.

The species is not uncommon in the dry jungle about Closepet, where, however, it never seems to grow beyond a stunted shrub and is not distinguished by a vernacular name. Although small, the wood is exceedingly hard and difficult to work, in fact inasmuch so that it has been called iron wood and is mentioned as a possible substitute for box.

When trained, it forms an attractive garden bush with glossy foliage and thick clusters of small blue flowers growing on the woody limbs behind the leaves. But growth is slow even under the best treatment. *Memecylon Heyneanum*, Benth. is also indigenous to the mixed jungle skirting the hills.

XXXIV. LYTHRACEÆ.

299 **Lawsonia alba,** LAMK. *Kan.* Goranti, Gorantlu.

Fig.—*Bot. Plates Lal-Bagh Collection. Wight Ill. t. 87.*

References.—*Dict. of Econ. Prod. of Ind.; Drury U. Pl.*

The Henna shrub. This important dye plant is not very abundant in Mysore, but the Muhammadans are fond of it and often cultivate it carefully within their garden or house enclosures. Ladies of the harem manufacture henna for domestic use, while the leaves and flowers are much esteemed in medicine; the flowers are also sweetly fragrant. When correctly pruned, the *Lawsonia alba* forms a useful privet-like hedge.

Cultivation.—Propagate from seed, and plant in any ordinary soil where there is means of occasional irrigation while the plants are young. The shrub

succeeds best near the sea, but also thrives fairly well inland, especially when manured with fish, salt, and other maritime ingredients or composts.

300 **Lagerstrœmia indica,** LINN.

Fig.—*Bot. Plates Lal-Bagh Collection. Wight Ill. t. 86.*

Reference.—*Fl. of Brit. Ind.*

A deciduous flowering shrub cultivated in gardens, but not observed in the wild state. The pinkish-lilac flowers make a great show during the warm season, when the bush is bare of leaf. Propagate from offsets and suckers.

301 **Lagerstrœmia parviflora,** ROXB. *Kan.* Cheninge, Channangi, Ventaku ?

Fig.—*Wight Ic. t. 69. Bedd. Fl. Sylv. t. 31.*

References.—*Fl. of Brit. Ind.; Dict. of Econ. Prod. of Ind.*

A small deciduous tree of the open plateau. Never large in Mysore, although it is reported to attain to a height of 60 feet at the base of the Western Himalaya. In this province it is mostly found skirting the larger deciduous forests and among the hill ranges of the Eastern Ghât. Wood very light grey tinged with red and turning darker towards the centre; straight-fibred, tough, elastic. Weight 40—60 lb. per cubic foot. Used for agricultural implements and considered fairly durable. The bark affords fibre, gum, tan and dye, the gum being edible. It is one of the trees on which the tasar silkworm feeds.

Cultivation.—Easily propagated from seed, but slow of growth for some years and requiring porous soils where there is little stagnation of water. It is perhaps on this account that healthy trees are seldom found in hollows or marshy ground.

302 **Lagerstrœmia lanceolata,** WALL. *Kan.* Nandi, Nundi, Bolundur ?

Fig.—*Bedd. Fl. Sylv. t. 30. Wight Ic. t. 109.*

References.—*Brand. For. Fl.*; *Dict. of Econ. Prod. of Ind.*

A large or middling-sized tree of the Malnad and Coorg. Bark white, smooth, given off in thin flakes. Leaves deciduous in the dry season, smooth, white beneath; average blade 3×1 in. Flowers preceding the young leaves, small but very numerous, pinkish lilac. One of the reserved trees of the State forest. Wood yellowish-brown changing to red in the centre, smooth, even-grained, elastic, tough and of great transverse strength. Weight 41–48 lb. per cubic foot. Seasons well and is durable if preserved from moisture. But felled trees soon decay if left exposed to the weather in the forest. The large beams in the roof of the Palace at Mercara are of this wood, and it is highly prized in Coorg for building purposes. It is also used for making furniture, carts, and grinding mills. But the tree is held sacred by some of the hill people, who will not utilise it economically on that account.

Cultivation.—Raise from seed and plant in the hill sholas where the rainfall is 75—100 inches per annum.

303 **Lagerstrœmia Flos-Reginæ,** Retz. *Kan.* Challa, Chella, Holedasal ?

Fig.—*Bot. Plates Lal-Bagh Collection. Wight Ic. t 413. Bedd. Fl. Sylv. t. 29.*

References.—*Brand. For. Fl.*; *Dict. of Econ. Prod. of Ind.*; *Fl. of Brit. Ind.*

A large tree of the Ghât forests. Sometimes called the "Pride of India" on account of its gorgeous blossom. The latter breaks forth in May or June, supported by the young leaves, and is truly a splendid sight. The panicles, which are mostly terminal, are two feet in length, while the individual flower is not less than three inches in diameter and mauve-purple in color. While in blossom the tree can be seen for a long distance off.

The leaves are deciduous for some weeks at the beginning of the year; average blade 7×2½ in. Capsule the size of a gooseberry, but made to appear larger by the accrescent calyx forming an ornamental cup at the base, with six horizontal points. Wood light coloured, strong, and very durable under water. Weight 40—45 lb. per cubic foot.

Beddome says it is used in the Gun-carriage factory at Madras. A coarse fibre is obtained from the inner bark; and Lovery reports that the fruit is eaten in the Malnad. The trees cultivated in the Botanical Gardens are somewhat stunted in growth, although they are perhaps more prolific of flowers than the hill tree.

Cultivation.—Owing to the difficulty of procuring fertile seed from cultivated trees, the species has not spread so much in cultivation as it otherwise would have done. Seed should therefore be obtained from the hill forests, when they will be more likely to germinate freely. Plant out in deep garden soil when the seedlings are a foot or more in height. The drier climate of the maidan causes the tree to be very productive of flowers and fruit, but the latter are undersized, while the seed is more or less imperfect.

304 Punica granatum, LINN. *Kan.* Dalimbe, Dalimbare, Huli dalimbe.

Fig.—*Bot. Plates Lal-Bagh Collection. Wight Ill. t. 97.*

References.—*Dict. of Econ. Prod. of Ind.*; *Brand. For. Fl.*

The pomegranate tree. This is rather extensively cultivated for its fine fruit, but seldom attains to more than a dense bush of erect habit. It is very ornamental while in flower and fruit, these products being prominent and brightly coloured. But the fruit imported from Afghanistan and the

Persian Gulf Ports, is much superior in quality to what is commonly grown in local gardens. In size, the pomegranate varies from that of an apple to a small pumelo. Technically, it is a large berry, with numerous seeds unbedded separately in coloured cellular tissue, the abundance and quality of which regulate the nature of the fruit as a dessert product. Wood small, but hard, fine-grained, and capable of receiving a good polish. Gamble refers to it as a possible substitute for box. Walking sticks are populary made from it, and it forms excellent handles for tools and instruments. The fruit, rind, seed, and root-bark, are all medicinal products, while dyes and tans are contained in the bark, and, perhaps more intensely, in the green rind of the fruit.

Cultivation.—To obtain good crops of fruit, this tree must be highly cultivated in the best land under irrigation. Seedlings are easily raised, and the different local varieties have been inarched to a small extent. Plant at 8 feet apart, leaving the upper soil as loose and porous as possible. The full crop of a single tree is worth, on the average, Rs. 2, so that under proper management 50, trees should be worth Rs. 100 per annum to the cultivator. It is the favourite fruit of the Musalman.

XXXV. ONAGRACEÆ.

305 Jussiæa suffruticosa, Linn. *Kan.* Kavakula.

Fig.—*Bot. Plates Lal-Bagh Collection.*

An undershrub of nallahs and marshes. The whole plant is astringent. Reduced to powder, it is popularly used by the villagers in cases of dysentery. Very common.

XXXVI. PASSIFLOREÆ.

306 Carica Papaya, Linn. *Kan.* Parangi mara.

A subherbaceous fruit tree with a succulent or pithy trunk and no branches. Naturalised in India, but originally introduced from the West Indies and Central America.

This well-known tree is cultivated throughout the province for its fruit, which is consumed as a vegetable when young and tender, and as a fruit when ripe. Brandis says "meat becomes tender by washing it with water impregnated with the milky juice, or by suspending the joint under a tree."

This fact is well known too in South India, the property being due to the presence of an active principal called *papaine*. The latter is extracted from the fruit in the West Indies in the form of a white powder, and largely exported to France and Germany. The male flowers of the species are deliciously fragrant, and might be worth-producing in quantity for use in perfumery. Fruit the size of a small melon and not unlike it generally.

Cultivation.—The 'papaw' grows spontaneously from seed and thrives to perfection in rich garden soil. One male tree is perhaps sufficient to fertilise 50 pistilliferous trees, and should be planted in at least that proportion throughout the garden. Self-sown trees come up in backyards and rubbish heaps.

XXXVII. CACTEÆ.

307 Opuntia Dillenii, HAW. *Kan.* Papas kattali.

The prickly pear. This succulent bush is naturalised on the plains of India, and in some parts of the Madras Presidency—as in Salem and Coimbatore—where it covers extensive tracts of dry land. Various attempts have been made to utilise the species commercially, but as yet these have been attended with little success, and the shrub is generally looked upon as an obnoxious and persistent pest.

But so long as barren land is occupied such is not the case, the chief function of the prickly pear being to assist nature in making unproductive soils productive. This it does, rather quickly, in a number of ways, the chief of which are increased hygrometric action on the surface, interception of movable matter on the occupied area, and the rapid addition of a surface layer of vegetable soil. When these forces have been in action for a few decades, it will be possible to replace the prickly pear with a more directly useful class of plants.

It is not the fault of the prickly pear that it has been allowed to occupy areas, for which it is not intended, and where its functions as a coloniser are rendered useless. The utility of the plant as a fence for villages, railways, and reserved forest, is therefore fraught with great danger, as in good soils it spreads very rapidly and becomes, what it already is in many parts of the country, a dreaded pest to the cultivator. The Malta prickly pear, which is considered a good fruiting variety, has recently been introducd into local cultivation.

Cultivation.—Confine the prickly pear to the poorest soils where domestic plants will not grow. Propagate by division of the lobes or joints of the stem, every one of which will grow independently.

XXXVIII. ARALIACEÆ.

308 Heptapleurum venulosum, SEEM. *Kan.* Bili bhuthala.

Fig.—*Bot. Plates Lal-Bagh Collection.*

A small soft-wooded tree, or, when in contact with other trees, a large glabrous climber with glossy-digitate leaves, and oval, yellow fruit. Occasionally met with all through the forests. Uses unknown.

Cultivation.—Propagate from seed and cuttings. Growth is satisfactory in ordinary field and garden

soil. When properly trained, the species makes rather an attractive little tree.

309 Brassaia actinophylla, ENDL.

The umbrella tree. A handsome evergreen species cultivated in the Lal-Bagh, and introduced from East Australia. The large digitate leaves have stout petioles 15—20 in. in length. The leaflets are also stalked, and vary from 8 to 16 in number. Flowers in large terminal panicles which are rigid, and coral-red in colour. This is an ornamental and distinct species, worthy of a place in gardens and pleasure grounds. Easily propagated from seed and cuttings; but a deep soil is necessary to insure shapely growth.

XXXIX. CORNACEÆ.

310 Alangium Lamarckii, THWAITES. *Kan.* Ankole, Ankalige, Ansaroli?

Fig.—*Wight Ic. t. 194. Wight Ill. t. 96.*

References.—*Dict. of Econ. Prod. of Ind.; Brand. For. Fl.; Fl. of Brit. Ind.*

A small deciduous tree, often reduced to a mere shrub. In the latter form it makes a good fence, for which it is occasionally utilised in Mysore. The species coppices well and affords excellent fuel. Wood light yellow outside, brown to dark brown in the centre, hard, even-grained, tough and durable. Weight 49—56 lb. per cubic foot. When well seasoned, it is a highly ornamental wood with a fine glossy surface. It is used for pestles, wooden bells, and other minor purposes. There is a superstition in Mysore that, when this wood is felled and brought in to the house at midnight, on new moon day, the latter falling on a Sunday, it possesses the power to drive away devils. The acid fruit is eaten; and nearly every part of the tree is considered medicinal.

Cultivation.—The species is propagated from seed and offsets, but in either method the growth is exceedingly slow at first; and the most careful treatment will often result in a stunted shrub. In tracts where the tree is established, reproduction is best attained by coppicing, which induces the lateral growth of numerous offsets.

311 Cornus macrophylla, Wall. *Kan.* Hadaga.
References.—*Brand. For. Fl. 252. Fl. of Brit. Ind.*

Lovery describes this as "a large tree found in the Malnad, but very scarce. Wood finely close-grained and fit to be worked up and polished. Good for building and furniture." In the deciduous forests of the maidan, it does not attain a very great size, but the wood appears to be used for paddy grinders and agricultural implements. More information is needed as to the condition, merit, and uses of the species. The fruit is edible, and goats are said to browse on the leaves.

Cornus capitata, Wall. should be found on the hills. It is a small hairy tree having dense heads of connate flowers subtended by four large white bracts.

XL. RUBIACEÆ.

312 Sarcocephalus cordatus, Miq.
Fig.—*Bedd. Fl. Sylv. t. 318.*

References.—*Kurz. For. Fl. Burm.; Gamble Man. Timb. 218.*

A small tree cultivated in the Botanical Gardens. Indigenous to parts of Ceylon and Burmah. An ornamental species with globular heads of yellowish flowers which are very fragrant. Wood rather light and coarse grained. Beddome has recorded that it is used for making sandals. Fruits combined in a round fleshy mass, the size of a potato-plum.

313 Anthocephalus Cadamba, Miq. *Kan.* Kadaval, Kadvala, Cowdeyal?

Fig.—*Bot. Plates Lal-Bagh Collection. Bedd. Fl. Sylv.* 127, *t.* 35.

References.—*Pharm. Ind.; Dict. of Econ. Prod. of Ind.*

In the Malnad, this fine tree attains a great height and affords dense shade from its spreading branches. But in the early stages of growth it assumes a compact conical form. It is sacred to the consort of *Siva*, and the fragrant flowers produced in globular heads are offered at some of the native shrines. These flowers are most odoriferous at night and are supposed by the Hindus to possess some magnetic influence in the interests of love. "The tree is planted near villages and temples, and is held to be sacred. It is the *Arbor Generationis* of the Maratha Kunbis, and a branch of it is brought into the house at the time of their marriage ceremonies."

Pharmacographia Indica.

Wood white with a yellowish tinge, soft and open grained, cracks when exposed. Weight about 40 lb. per cubic foot. Graham Anderson says it is useless, except for making bath-brick boards. Dombers use it for their play-posts and, occasionally, when better timber is not at hand, it may be used for various domestic purposes. The fruit and bark are medicinal; and the tree is occasionally referred to by English settlers as the 'wild cinchona.' Fruits confluent into a spherical mass, the size of a small orange.

Cultivation.—It is only in the moist region of the hills, where this tree attains its full size and beauty and where it is reproduced by seeds and offsets. The globular flower heads are orange-coloured, with white club-formed stigmas projecting well beyond the corollas. Very ornamental.

314 Adina cordifolia, Hook. *Kan.* Bachanige, Hettega, Yettega, Hedde, Arsinatega.

Fig.—*Brand. For. Fl.* 263, *t.* 33.

References.—*Fl. of Brit. Ind.*; *Dict. of Econ. Prod. of Ind.*; *Pharm. Ind.*

A lofty tree of the hill forests and maidan adjacent to the hills. It occasionally attains an enormous size and is well known by the vernacular name *Arsinatega*, meaning "yellow teak." Commonly met with all through the Malnad and parts of Coorg. Leaves deciduous, roundish cordate, leathery; stipules large and caducous. Fruit capsular—a character which at once distinguishes the species from 312 and 313—seeds numerous. Wood uniformly yellow, or changing by exposure to reddish brown, with no heartwood nor annular rings. Weight 42—50 lb. per cubic foot. Although somewhat liable to warp and crack, this wood seasons well, takes a good polish and is considered by some fairly durable in cabinet work; it is also prized in Bombay for its durability in water, on which account it is much used for fishing-stakes. But the seasoned wood is said to be very subject to the attacks of the carpenter bee, *Apis xylocarpa*.

It turns well, and is specially useful for making small articles such as combs, gunstocks and ornamental boxes. But the species is best known for its bitter bark, which is a popular febrifuge and antiseptic among the agricultural classes.

Cultivation.—The species is propagated from seed and offsets, but never attains its full development far away from the hills. A deep virgin soil, watered annually by 75—100 inches of rain, is perhaps the best medium for good growth.

315 Stephegyne parvifolia, KORTH. *Kan.* Kadagada, Kadani, Cuddaru?

Fig.—*Bedd. Fl. Sylv. t. 34. Wight Ill. t. 123.*

References.—*Brand. For. Fl, 262. Dict. of Econ. Prod. of Ind.*

In Mysore, this is a deciduous tree of medium or large size, according to position, but always attaining its largest dimensions in the moist valleys of the Malnad, or hill country.

"Wood grey to light-reddish brown, compact, close and fine grained, hard. Weight 35—47 lb. per cubic foot, seasoned; 54 lb. green. Durable if not exposed to wet. No distinct heartwood. Medullary rays very numerous and fine. Easily worked, and polishes well. Used for building, furniture, agricultural implements, combs, and to a large extent for turned and carved articles, such as platters, cups, and spoons. The leaves are used for fodder."

Brandis.

Kadagada mara possesses social habits, and, like the *Mugali*, it multiplies rapidly in moist situations. It does not appear to be much used in the south, although, judging from the above quotation, it is of considerable value in the north of India. Capsule of 2 dehiscent cocci, very small and numerously seeded.

Cultivation.—Raise from seed and plant in sholas, where the rainfall is 75—120 inches. The seed should be taken from old trees in the best situations, otherwise it may not germinate.

316 Hymenodictyon excelsum, WALL. *Tel.* Bandaru.

Fig.—*Wight Ic. t. 79. Bedd. Fl. Sylv. t. 219, A. only.*

Reference.—*Fl. of Brit. India.*

Usually a small deciduous tree, but occasionally middle-sized and rarely large. Inner bark reddish, astringent, and very bitter. Said to be in common use among the country people as a tonic and febrifuge. But fuller information is needed as also good specimens of the tree. It frequents dry hills, deciduous tracts, and the outer fringe of the evergreen belt.

317 Hymenodictyon obovatum, WALL.

Fig.—*Bedd. Fl. Sylv. t. 219. Wight Ic. t. 1159.*

Reference.—*Fl. of Brit. Ind.*

A deciduous tree of the Baba Budan hills. Mostly larger in all its parts than *H. excelsum.* The living bark is bitter and astringent, but is said to lose these properties when dried. It is not red in colour.

318 Wendlandia Notoniana, WALL. *Kan.* Bettada kammagaggare.

Fig.—*Bedd. Fl. Sylv. t. 224.*

A small tree growing plentifully at Nundydroog. Flowers reddish-white fragrant. It is not known if the species is abundant, or if it possesses economic value. Enquiry should be made by the forest officer of the Kolar District.

319 Wendlandia Lawii, HOOK. Closely allied to the foregoing and said to be plentiful on the Baba Budan hills. Specimens should be submitted with the vernacular name and such local data as can be relied upon.

320 Mussænda frondosa, LINN. *Tam.* Vellaellay.

Fig.—*Bot. Plates Lal-Bagh Collection. Wight Ill. t. 124.*

References.—*Fl. of Brit. Ind.*; *Pharm. Ind.*

This attractive shrub is not plentiful in the interior of Mysore, although it is no doubt common in the scrub jungle of the south-eastern frontier. In the Presidency of Madras, it is much esteemed for its medicinal properties, in which the leaves, flowers, fruit, and root, all contribute a part. It is well marked by its white calycine leaves which form an interesting contrast with the sombre green of the proper leaves. Hence the vernacular appellation 'white leaf.' But it is an exceedingly variable plant in different situations, and in the "Flora of British India," Sir Joseph Hooker has diagnosed

no less than six varieties. Of these, the variety *grandifolia*, which is cultivated in the Lal-Bagh, is perhaps the most ornamental. The bush is supposed to be a favourite of the goddess of fortune from the fact of its bearing the white mark of *Vishnu* or *Krishna*.

Cultivation.—The garden specimen has never borne seed, although it flowers freely. Propagation is therefore effected by layering. Cuttings of soft shoots will also take root in bottom heat. The shrub is very hardy and stands long periods of drought unimpaired.

321 Webera corymbosa, Willd. *Kan.* Papati.

Fig.—*Wight Ic. t. 309, 584 and 1064.*

Reference.—*Fl. of Brit. Ind.*

This very common shrub occasionally assumes the form of a miniature tree, but the maidan specimens rarely exceed 8 feet in height. The small wood burns brightly, and is much prized by the country dhoby. It is carried into the bazaars in bundles, and sold as fuel.

322 Randia dumetorum, Lamk. *Kan.* Mangare, Mangare-bongare.

Fig.—*Wight Ic. t. 580, 581, 582 and 583.*

References.—*Dict. of Econ. Prod. of Ind.; Pharm. Ind.; Fl. of Brit. Ind.*

A rigid shrub or small tree armed with spines 1″ to 1½″ long. Common in Shimoga, and skirting the Ghâts, but somewhat rare in the drier tracts. Flowers large, white changing to yellow, fragrant. Fruit the size of a small apple, much esteemed as an Indian emetic. When members of the *Vaisya* caste are being married, fruits of the *Mangare* and *Yedamuri* are fastened on to the wrists of the happy pair.

This is an indispensable ceremony. The forest officer at Shimoga gives the following particulars:—

A small tree, common everywhere. Wood heavy and strong but liable to warp; used for agricultural implements, fences and fuel. Bark and fruit used in medicine.

Cultivation.—Growth is very slow in almost any position. A nallah or old well recently filled up with soil and rubbish, is perhaps the best site. Propagate from seed.

323 Randia uliginosa, DC. *Kan.* Kare, Pendri, Pandri?

Fig.—*Wight Ic. t. 397.*

Reference.—*Dict. of Econ. Prod. of Ind.*

A glabrous tree of very rigid habit, with or without spines. Flowers large, white and solitary. Fruit pear-shaped, and edible when roasted or boiled; sold in the bazaars in localities where the tree is plentiful. The whole tree is considerably larger than *R. dumetorum*, and should be found on the eastern and southern borders of the province. The species *R. rugulosa*, Thw. and *R. Candolleana*, W. and A. are also referred to Mysore and the Western Ghâts.

324 Gardenia lucida, Roxb.

Fig.—*Wight Ic. t. 575.*

A small tree of West Mysore and Coorg. Leaves deciduous, glabrous, short-petioled, elliptic, obtuse, many nerved; average blade 7×3 in. Flowers axillary, solitary, large, fragrant, white changing to yellow. Fruit oval or subglobose.

325 Gardenia gummifera, Linn. *Kan.* Bikke, Dikkemalli, Kambi.

Fig.—*Bot. Plates Lal-Bagh Collection.*

References.—*Pharm. Ind.*; *Dict. of Econ. Prod. of Ind.*

A deciduous shrub or small tree according to situation. Buds and young foliage resinous and shining, as if they had been plunged into water.

Flowers large, white changing to yellow, fragrant, appearing in May with the young leaves. Fruit the size of a guava, woody and containing 30—50 seeds. Wood white, very hard, might be used for engraving. Fruit said to be eaten in the Malnad. But the species is best known by its medicinal gum-resin known to the trade as *Dikamali.* The latter product has an offensive smell resembling cats urine, is hand-collected, and has a marketable value of Rs. 3-12 per maund of 37½ lbs. Cultivated in the Botanical Gardens.

Cultivation.—Thrives well in a deep reddish loam, but only attains size where there is perennial moisture. Removed from the fruit, the seeds germinate quickly.

326 Gardenia latifolia, AIT.

Fig.—*Wight Ic. t. 759.*

Reference.—*Fl. of Brit. Ind.*

A small deciduous tree of the dry-hill districts. It is a highly ornamental species when in blossom, and should find a place in gardens and pleasure grounds. The fruit is said to be eaten. Wood whitish, hard and durable. Weight 52—55 lb. per cubic foot.

Cultivation.—As for the preceding species, but requiring less moisture, and better adapted for naturally dry situations.

327 Canthium didynum, ROXB. *Kan.* Yeddaranike.

A common shrub of waste land. Bark medicinal. The leaves smell of coriander. Wood said to be good for tool handles.

328 Canthium umbellatum, WIGHT. *Kan.* Abalu, Abblu.

Fig.—*Wight Ic. t. 1034.*

References.—*Brand. For. Fl.; Gamb. Man. Timb.*

Although this handsome evergreen tree is now confined to the Malnad and Coorg, it is worthy of culture for ornament in gardens. It may also be found on the Baba Budan hills. But the descriptions of Brandis and Gamble are at variance, and may apply to different species. The vernacular names are also doubtful as they are in some cases applied to *Flacourtia inermis*, a small tree of the *Bixineæ*. The wood of the species under notice is reported to be hard and close-grained. Weight 57 lb. per cubic foot.

329 Canthium parviflorum, Lamk. *Kan.* Kare.

Fig.—*Bot. Plates Lal-Bagh Collection.*

References.—*Fl. of Brit. Ind.; Dict. of Econ. Prod. of Ind.; Pharm. Ind.*

A rigid spiny bush or rarely a small tree. Very common in the maidan and usually affecting dry rocky positions. Fruit commonly eaten. The leaves are also edible, but are most prized for their supposed medicinal properties, a decoction of them being prescribed in different stages of flux. The small wood is suitable for turning. The shrub is gregarious in some parts, always difficult to exterminate, and, properly trimmed, forms a good fence.

Cultivation.—Under artificial treatment, the species makes very slow growth, but seeds dibbled in between the crevices of rocks will soon germinate and form strong plants. Once started in this way, the *Kare* soon multiplies itself by seed and offsets.

330 Vangueria edulis, Vahl.

A small tree of Madagascar. Recently received at the Lal-Bagh, and said to be cultivated in some parts of India for its fruit.

331 Ixora parviflora, Vahl. *Kan.* Gorivi, Hennu gorvi, Gorabikattige.

Fig.—*Bedd. Fl. Sylv. t. 222. Wight Ic. t. 711.*
References.—*Dict. of Econ. Prod. of Ind.*; *Brand. For. Fl.*; *Fl. of Brit. Ind.*

This is the well known torch tree of the Malnad and Coorg. There are two varieties, differing somewhat in form and size, but they are both evergreen, resinous trees of rather stunted dimensions. The green wood burns so well that torches of it are commonly carried by travellers and tappal runners to light the way in dark nights. The white honey-scented flowers are produced in great abundance during the months of March and April, when they exhale a strong perfume in the forests. They are supposed to be very efficacious in the treatment of whooping cough, when pounded in milk and taken internally. Although rather small, the wood is said to be hard and even-grained. Weight 57—66 lb. per cubic foot. The tree is ornamental and should find a place in private grounds. It is reported that the small black berries are eaten in some parts.

Cultivation.—Easily raised from seed and can be successfully grown in any soil of ordinary fertility. In dry tracts it should be confined to the sides of channels or tanks.

332 Ixora coccinea, LINN.

A woody shrub cultivated in gardens for its handsome crimson flowers. It is known to a few Europeans as the "flame of the forest" and "jungle geranium." The species is sacred to *Shiva* and is said to possess medicinal virtues of some importance. Several allied species exist in the scrub tracts and skirting the evergreen belts, especially *I. Bandhuca*, *I. alba*, and *I. acuminata*. These are all good border shrubs with pretty flowers.

Cultivation.—Propagate from seed, layers and cuttings. All the species require a deep retentive soil with an open aspect and moderate rainfall.

333 Pavetta indica, LINN. *Kan.* Pavate, Pappadi.

Fig.—*Wight Ic. t. 148.*

References.—*Dict. of Econ. Prod. of Ind.; Fl. of Brit. Ind.; Brand. For. Fl. 275.*

A deciduous shrub or small tree of variable character. Plentiful in the scrub tracts and on the isolated hills of the interior. It is commonly used for fuel; and the root and leaves are medicinal. The Flora of British India enumerates five varieties of the species.

334 Coffea arabica, LINN.

The vernacular is a corruption of the English name of the product, and nothing more.

The Arabian coffee bush is largely cultivated on the hills of Mysore and Coorg. In the first named province, the principal seats of cultivation are Chikmagalur, Manjarabad, Koppa and the Baba Budan hills. Its cultivation was established at the first named place by Mr. Cannon about the year 1830; since which date many thousands of acres have been cleared of virgin forest to make room for coffee. An interesting experiment of growing this product under irrigation at Bangalore, has proved very successful for several consecutive years, and Mr. Meenachshaiya, the owner of the estate, is sanguine of its becoming a profitable industry in carefully selected sites.

The crop now on view, at Rochdale Park, is certainly much heavier than what is usually seen on the hill estates. But whether the coffee plant will sustain forcing for any length of time, is yet a matter of experiment.

For best results on the hills, the bush requires a certain amount of shade, but in supplying this, a very judicious selection of trees becomes imperative, in case that the latter should do more harm than

good. Planters are now fairly agreed that the species named in the following list afford the best shade for coffee, but for obvious reasons it is impossible to single out one tree and say it excels in every locality and under all conditions of treatment. Such a tree is not to be found in nature. But in giving the names of popular shade-trees, some attempt has been made to classify them according to their supposed order of merit or precedence :—

1 Ficus glomerata. Atti. Not so good when aged.
2 Dalbergia latifolia. Biti.
3 Terminalia belerica. Tare.
4 Pterocarpus marsupium. Honne.
5 Acrocarpus fraxinifolius. Howlige.
6 Albizzia odoratissima. Bilvara.
7 Artocarpus integrifolia. Halasu. Not good when aged.
8 Lagerstrœmia microcarpa.
9 Cedrela toona. Noge.
10 Ficus bengalensis. Alada mara. Not very suitable in poor land.
11 F. tuberculata.
12 F. mysorensis. Goni.

Liberian coffee, *Coffea Liberica,* has also been established on some of the estates. Left to itself, it becomes a small tree.

335 Morinda citrifolia var. bracteata.

A shrub or small evergreen tree with large glossy leaves and white fragrant flowers, the latter produced in a peculiar cone-like inflorescence. Cultivated in the Lal-Bagh, but not known to be indigenous to any part of the province. The specific form is known to afford the greater part of the *Al* dye of Indian commerce, a product which is obtained from the root of the plant. *Morinda umbellata,* Linn. is also cultivated in the Botanical Gardens, and may be indigenous to the Malnad. The roots

yield a yellow dye which is locally known as *Maddi banna.* The fruit is said to be curried and eaten.

Psychotria. Several species of this large sub-tropical genus are found in the hill tracts of Mysore. They are shrubs or small trees with smooth ever-green leaves and clusters of reddish berries somewhat resembling small coffee berries. Those most likely to be found in the hill forests are *P. Thwaitesii*, *P. truncata* and *P. Dalzellii.* Coffee can be inarched with more than one of the above named, but with what result has not been proved.

336 Rubia cordifolia, Linn. *Kan.* Manjushta.

Munjeet or Indian madder. A deciduous climber of village fences, intermediate hills, and waste tracts. The roots possess a colouring matter which is of very ancient utility as a dye. It is not, however, equal to the imported European madder, which is the produce of *Rubia tinctoria.*

337 Hamelia patens, Jacq.

A small evergreen tree of South America. Cultivated in the Lal-Bagh as a hedging plant and as an ornamentally-pruned bush or small tree. A row of the latter may be seen on the terrace bank at the Cubbon Park.

Cultivation.—The species is unproductive of seed in Mysore, so that propagation has to be entirely effected by division. Cuttings soon take root during the rains. The plant stands a wonderful amount of pruning, and may on that account be trained into various artistic or grotesque forms.

338 Cinchona succirubra, Wedd.

Fig.—*Howard's Ill. Neuva Quinologia p. 7.*

References.—*Pharm. Ind.; Dict. of Econ. Prod. of Ind.*

The red bark. This important tree, with the allied species *C. officinalis*, Hook,—Loxa, crown,

Condaminea, or pale bark,—*C. calisaya*, Wedd.—yellow bark,—and *C. calisaya var. Ledgeriana*, are cultivated to some extent in the coffee-planting districts of Mysore and Coorg. But *Cinchona* bark is scarcely an export article at present, although very good samples are said to have been forwarded to the English market. The total area under private cultivation in Mysore and Coorg possibly does not exceed 2,000 acres. When a sufficient number of factories have been established in the country for the preparation of quinine, and especially for the extraction of the alkaloids, cultivation will become more remunerative than it has been in the past. *Cinchona* trees are of no value in the maidan portion of Mysore, but a good field for production might possibly be found in the Baba Budan range.

XLI. COMPOSITÆ.

339 Vernonia arborea, Ham.

A small evergreen tree cultivated in the Botanical Gardens. It is indigenous to the Nilgiri range and may be found on the higher altitudes of Western Mysore. Of *Compositæ*, it is the only arborescent species found in Southern India.

XLII. MYRSINEÆ.

340 Mæsa indica. Wall.

A small evergreen tree of the extreme western forests. Berries edible.

341 Embelia robusta, Roxb.

In hilly tracts towards the west of Mysore. A rambling shrub or small tree. Fruit edible and medicinal. *E. Ribes*, Burm. is an allied species, the berries of which are much prized in native medicine, It is a strong woody climber known by the Kanarese names *Vayubilaga* and *Vayivalanga*. The fruit of

both species is supposed to be collected under a common vernacular name.

342 **Ardisia humilis,** VAHL. *Kan.* Bodina.

Fig.—*Wight Ic. t. 1212.*

References.—*Fl. of Brit. Ind.; Bedd. For. Man.; Dict. of Econ. Prod. of Ind.*

A large evergreen shrub of Hassan, Shimoga and Kadur; or, in the variety *arborescens*, a small tree of 25 feet. Both forms are cultivated in the Botanical Gardens, where they thrive without care and always look attractive. Leaves very shortly-petiolate, oblong to elliptic, stout and leathery, cuneate at the base and crowded towards the ends of the branchlets. Flowers pink, fleshy. The berries, which are very numerous, afford a yellow dye which is scarcely known at present. Other species of *Ardisia* should be searched for in the hill region.

XLIII. SAPOTACEÆ.

343 **Achras sapota,** LINN.

Fig.—*Bot. Plates Lal-Bagh Collection.*

This is the Naseberry or Sapodilla of the West Indies. A small evergreen tree that fruits freely in the Lal-Bagh, during the months of March and April. It is easily propagated from seed and will, no doubt, become naturalised as a garden tree. Long periods of drought are unfavorable to it, and to be highly productive of fruit, it requires proper attention in the matter of irrigating and manuring. Well-grown Sapodillas are the size of a large apple, round or oblong according to variety.

Taken at the proper stage of ripeness it is a delicious fruit. But it is not attractive to the eye, owing to the external covering being of the same colour as the bark of the trunk. The cultivation of this useful species should be encouraged in fruit gardens.

344 Chrysophyllum Cainito, LINN.

A small evergreen tree, the leaves being of a golden hue underneath, and therefore very ornamental. It is the 'star apple' of the West Indies. Recently introduced into the Botanical Gardens. The fruit, which is the size of an English apple, is said to be edible.

345 Sideroxylon inerme, LINN.

Iron wood. A small evergreen tree introduced from the Cape of Good Hope. It grows slowly and builds up wood of an exceptionally durable quality. *S. tomentosum,* Roxb. an indigenous species, should be looked for in the moist sholas of the western Malnad. It is a small densely woolly tree with yellow berries the size of a gooseberry.

346 Dichopsis elliptica, BENTH. *Kan.* Pauchonta?

Fig.—*Bedd. Fl. Sylv. t. 43.*

References.—*Dict. of Econ. Prod. of Ind.*; *Gamb. Man. Timb.*; *Fl. of Brit. Ind.*

The Pauchotee or Indian Gutta tree. This fine species attains a height of 100 feet and is said to be abundant in the moist sholas of the Western Ghâts. It is also found in Coorg and on the Baba Budan hills. The milk-sap is used in some parts as an adulterant for the true Gutta-percha of Singapore, but it is doubtful if the indigenous product is ever collected, either for export or home use. Local information is wanted on this point, as it would seem that Indian Gutta has a commercial status in the Western Ghât forests of Madras and Bombay.

"A gigantic tree, 100 feet and up to 12 feet in girth, common in all the moist sholas of the Western Ghâts of the Madras Presidency, up to 3,500 or 4,000 feet, and in similar localities on the Bombay Ghâts; the timber is hard and not unlike sâl in its grain and takes a good polish. It is much employed

by planters for building purposes, and might be used for furniture. A sort of Gutta exudes from the trunk, which is known as *Pala* gum or Indian Gutta-percha. It is not of any value compared with the true Gutta-percha, but might be used as a birdlime or a cement, and perhaps for encasing telegraph wires. The tree is known by the native names of *Pálá* and *Pauchotee.*" *Beddome.*

In leaf, flower, fruit and general character, this tree resembles an *Ippe* of colossal size, and it is in fact nearly allied to the latter. Cultivation not known. Botanical specimens are required for the herbarium.

347 Bassia longifolia, LINN. *Kan.* Ippe, Hippe.

Fig.—*Bot. Plates Lal-Bagh Collection. Bedd. Fl. Sylv. t. 42. Wight Ill. t. 147.*

References.—*Thwaites Enum. 175. Pharm. Ind.; Dict. of Econ. Prod. of Ind.*

The Mowa or Mahwá tree of South India. Abundant throughout the maidan, but especially in village topes and in the road avenues where the tree is sub-deciduous and forms a compact roundish head of 40 to 50 feet in height. Leaves crowded at the ends of the branchlets, petiolate, glabrous, lanceolate, average blade $5 \times 1\frac{1}{2}$ in. The *Ippe* is distinguished from the *Mahwá* tree of Central India, *Bassia latifolia,* Roxb. by its narrow leaves and smoother bark; it is also nearly evergreen. The time of flowering is quite different as also the size of the flower, fruit and seed. Wood yellowish brown, to red in the centre, close-grained and moderately durable. Beddome recommends it for use under the water line as direct exposure to the air is injurious. Weight 61 lb. per cubic foot. Important medicinal properties are attributed to the flowers of the *Ippe,* as also to the concrete oil expressed from its seed. The oil is suitable for the

manufacture of soap and candles, but in Mysore it is mostly used for burning and very rarely as an article of food. Ghee is occasionally adulterated with it, although the bitter taste it imparts to that commodity should easily detect its presence.

A spiritous liquor is distilled from the flowers of *B. latifolia* in Central India; but there is no corresponding industry in the south, although the flowers of *B. longifolia,* contain the necessary ingredients in about the same proportion. A kind of sugar is prepared from the flowers on a small scale, but it is considered to be heating and bilious in its action. The flowers are much relished by cattle and vermin, and some of the jungle tribes partly subsist upon them. They appear with the young leaves at the close of the hot season, and are made apparent by their peculiar heavy odour. The fruit ripens in July and August. The bark affords an inferior gum generally known in the south as *Ellopa.* Having so many useful properties, this tree is well known to and much cultivated by the people.

Cultivation.—The *Ippe* appears to thrive best in stony soil or among rocky boulders, where there is a good depth of loam. It is easily raised from seed and should be planted out in the year following production. Seeds deposited by birds and squirrels often come up promiscuously. For avenue work plant at 45 feet apart. Large pits filled with loose soil of good quality will facilitate growth to a marked extent.

348 Bassia latifolia, Roxb. *Kan.* Kadu ippe? Kad hippe?

Fig.—*Bedd. Fl. Sylv. t. 41.*

References.—*Brand. For. Fl. 289. Dict. of Econ. Prod. of Ind.; Fl. of Brit. Ind.*

This is the proper Mowa or Mahwa tree of Central India. It is not very common in Mysore and never

forms gregarious woods as it does in the north. Leaves deciduous for nearly two months during the close of the cold and beginning of the warm seasons. Crowded at the ends of the branchlets, pubescent and coppery-red when young, eventually quite glabrous. Petiolate, oblong-elliptic shortly acute. Average blade 8×4 in. Flowers cream-coloured and honey-scented, not so heavy as in the last species. Berry the size of a Belgaum walnut with 1—4 seeds. The cultivation of this tree seems desirable, as its economic properties, although almost identical with those of *B. longifolia*, have been fully tested, and are therefore more appreciated than the properties of the latter. In Central and Northern India the species is a well known supplier of food, medicine, liquor and timber, although the last named product is usually exempted in favour of the more valued flowers and seeds. The *Kad Ippe* is mostly confined, as the name implies, to the jungle forests, but it rarely ascends beyond the mixed zone, nor does it appear to be much used in the domestic economy of the people. The wood, which is reddish-brown in colour, is protected by a thickish, corky bark which often cracks in horizontal rings or sections of rings. The quality of the wood is favorably reported on both by Brandis and Beddome. The dried flowers are eaten.

Cultivation.—Practically as for *B. longifolia*. The re-production noticed in some localities is probably due to the intervention of birds and vermin.

349 Bassia malabarica, BEDD.

Although this tree has not been reported from the Malnad, there is little doubt it exists on the western frontier.

350 Mimusops Elengi, LINN. *Kan.* Pagade, Boklu? Kanja, Pogada, Halmadhu.

Fig.—*Bot. Plates Lal-Bagh Collection. Bedd. Fl. Sylv. t. 40. Wight Ic. t. 1586.*

References.—*Fl. of Brit. Ind.; Dict. of Econ. Prod. of Ind.; Pharm. Ind.*

A very handsome evergreen tree of Western Mysore and Coorg. Cultivated at the Lal-Bagh and Nundydroog, but rarely seen elsewhere in the maidan. Much valued for its medicinal properties in which the bark, flowers, fruit and seed, all take a part. A culinary and medicinal oil is expressed from the seed, while the fresh flowers afford a volatile oil which is used in perfumery. The white star-like flowers are deliciously fragrant and fall from the trees abundantly during the warm season. When properly seasoned, the wood is said to be very durable ; it splits well and is locally prized for rice pounders. Weight about 60 lb. per cubic foot.

"It is close and even-grained, pinkish to reddish brown in colour and takes a good polish." *Beddome.* The fruit is eaten by the jungle people, and the tree is occasionally cultivated in gardens for its sweet scented flowers which are both worn as garlands and presented at the temples.

Cultivation.—Easily propagated from seed and only requiring deep soil and a uniform supply of water to produce a very handsome tree. It suffers from long periods of drought but recovers rapidly when timely rains fall. A position, where the subsoil never becomes hard and cracked, would produce the finest growth, or where the annual rainfall is 60 to 100 inches. It is a good shade tree for coffee.

351 Mimusops hexandra, Roxb.

Fig.—*Wight Ic. t. 1587.*

Reference.—*Brand. For. Fl. 291.*

This large, evergreen tree is confined to the evergreen zone of the Western Ghâts. Economic properties supposed to be nearly identical with those of *M. Elengi.* The heartwood is very hard, heavy and close-grained. Weight 60—72 lb. per cubic

foot. Brandis recommends it for turning. Forest officers make no mention of the species, but its existence in the western Malnad can scarcely be doubted. Corolla lobes only six in number, whereas in *M. Elengi* they are 16—20. *M. Roxburghiana*, Wight. has not been reported also, although there is little question of its existence in some of the hill forests. The cultivation of these trees is unknown, but judging from their position, it should be confined to the hill ranges, where there is plenty of shade and moisture.

XLIV. EBENACEÆ.

352 Maba nigrescens, DALZ.

A small tree of the Western Ghâts. Very hairy, "young branches almost shaggy." *Fl. of Brit. Ind.* Although small, the wood of this tree is said to be prized for rafters for native houses. It is also supposed that the berries are eaten by the hill people. More information is required with specimens and the local name.

353 Diospyros montana, ROXB. *Kan.* Jagalaganti, Bilkunika, Balkunika, Kalnandi.

Fig.—*Bot. Plates Lal-Bagh Collection. Wight Ic. t. 1225. Wight Ill. t. 148.*

References.—*Dict. of Econ. Prod. of Ind.*; *Brand. For. Fl.*; *Kurz. For. Fl. Burm.*

A small tree on the plains but attaining a larger size towards the hills and not uncommon all over the province. Pandits use the bark and heartwood in native medicine, and the fruit is used by the Travancore hill-men to poison fish. Wood yellowish-grey, finely grained, and easily worked; but very unpopular with the lower classes owing to the superstition that its presence in a house causes dissension and strife among the occupants. It is well adapted for making rafters, couples, and small articles of furni-

ture; and the enlightened Hindu should extend its usefulness in that capacity. It is a good fuel tree, and there seems to be no feasible objection to use it widely for that purpose, except that it is difficult to fell and is severe on forest tools. The fruit is not eaten by the people in this part of India. But birds masticate the seeds, and thereby sow them promiscuously.

Cultivation.—Re-productive in some situations. Propagate from seed and plant in any moderately good soil when the seedlings are a foot or more in height. Rocky land having a deep subsoil seems to answer well. The species coppices well, and may be planted in fuel plantations at 10—15 feet apart.

354 Diospyros Embryopteris, PERS. *Kan.* Kusharta? *Coorg.* Holle tupra.

Fig.—*Bot. Plates Lal-Bagh Collection. Bedd. Fl. Sylv. t. 69. Wight Ic. t. t. 843 and 844.*

References.—*Dict. of Economic Prod. of Ind.; Fl. of Brit. Ind.; Brand. For. Fl. 298.*

A handsome evergreen tree found rather abundantly in moist sholas and on the banks of rivers. Fruit the size of a large apple, coloured green and abounding in tannic acid; on exposure to the light, the inner white flesh quickly changes to a blackish colour. But the astringent and tannic properties disappear to a great extent as the fruit attains the full stage of ripeness, when it may be eaten in small quantities with perfect safety. The tree is perhaps best known by its Sanskrit name, *Tinduka*, an appellation which suggests the medicinal properties of the bark and fruit. An oil expressed from the seed is also medicinal. Local investigation seems to prove that the uses of this tree are comparatively unknown in Mysore and Coorg. It is cultivated in the Botanical Gardens, and fruits very freely every year. The wood, which is light brown, is not of much value.

Cultivation.—This is regulated by the presence of deep soil, a cool atmosphere, and plenty of moisture. The tree in the Lal-Bagh has never borne fertile seed, nor will it grow from cuttings. Seed should be procured direct from the Malnad, as the species is desirable for garden cultivation in moist shady positions.

355 Diospyros Ebenum, KŒNIG. *Kan.* Bale, Kare, Mallali.

Fig.—*Wight Ic. t. 188. Bedd. Fl. Sylv. t. 65.*

References.—*Dict. of Econ. Prod. of Ind.; Fl. of Brit. Ind.; Gamb. Man. Timb. 251.*

The ebony tree. This important species is confined to certain tracts in the Western Ghát forests. In the Shimogah district, Lovery states that it is "only found in parts of the Tirthahalli and Nagar Taluk Ghâts." The greenish-white sapwood is abundant in all but the oldest trees, and is not very durable; heartwood black, very hard, durable and takes a fine polish; but if not carefully seasoned, it is liable to split. Weight 78—80 lb. per cubic foot. Ebony is in great demand for cabinet work, turnery, inlaying, and musical instruments. In Mysore, it is highly prized by musicians both for stringed and wind instruments; but disappointment is often caused by the use of a spurious ebony, which is more accessible than the true kind. *D. melanoxylon*, which is also indigenous to the Malnad, may be the source of this inferior product. Although so valuable in the fancy-wood market, the ebony tree is still unreserved in the State forests. Is this due to its scarcity or to its being practically inaccessible to the local trade?

356 Diospyros microphylla, BEDD.

A large evergreen tree with box-like leaves. Met with on the hills and on the plains immediately under the hills. Uses unknown, but it is said to

flower in the cold season. The species is figured in Beddome's *Ic. Pl. Ind. Or. t. 218.*

357 Diospyros Tupru, Buch—Ham. *Kan.* Tupra.

Fig.—*Bot. Plates Lal-Bagh Collection.*

References.—*Dict. of Econ. Prod. of Ind.; Pharm. Ind.; Fl. of Brit. Ind.*

A small tree with foliage similar to that of the *Jamoon* or *Nai-nerale*. Fruit, the size of a crab apple, turning bright yellow in maturity, and generally eaten by cowherds and others.

In the rocky maidan, the species is often reduced to the size of a large shrub, but rises to a height of 30—35 feet in favorable localities. The leaves are used for folding native cigarettes; and a colouring paste obtained from the root is employed by the *Mahrattas* to distinguish caste.

358 Diospyros melanoxylon, Roxb. *Kan.* Mallali?

Fig.—*Bedd. Fl. Sylv. t. 67. Wight Ic. t. 1223.*

References.—*Brand. For. Fl.; Dict. of Econ. Prod. of Ind.*

In favorable localities in the hill sholas, this attains to a large tree of 60—80 feet, but outside the moist evergreen zone it becomes dwarfed, while in the maidan scrub jungle it is little more than a shrub. More information is required concerning it, especially with reference to its local utility in lieu of proper ebony. Herbarium specimens are also wanted. *D. paniculata*, Dalz. should be searched for in the western forests.

359 Diospyros Kaki, Linn.

A small tree of China and Japan. Cultivated in Indian gardens for its fruit, which is commonly called the "Chinese Persimmon". The latter is green in colour, the size of an apple, and pleasant to eat when fully ripe. Cultivated in the Lal-Bagh.

XLV. STYRACEÆ.

The large genus *Symplocos* is represented in Coorg and the Malnad by several species ranging in size from shrubs to small trees. But little or nothing is known as to the local economic value of these.

XLVI. OLEACEÆ.

360 **Jasminum sambac,** AIT. *Kan.* Mallige, Dundu mallige, Gundu mallige.

This, with several other species and varieties, is extensively cultivated in gardens. They are scandent shrubs or woody climbers of free growth. The jasmine flower is more esteemed than any other for providing garlands on the occasion of festivities and cermony. It also possesses medicinal properties, and the fragrant oil of jasmine enters largely into perfumery and medicine. Applied direct to the mammary gland, the fresh flowers are an excellent lactifuge.

361 **Nyctanthes arbor-tristis,** LINN. *Kan.* Parijata, Harsing.

Fig.—*Bot. Mag. t. 4900. Bedd. Fl. Sylv. t. 240.*

References.—*Fl. of Brit. Ind.; Pharm. Ind.; Dict. of Econ. Prod. of Ind.*

The night-flowering jasmine. A small tree in the north of India, but seldom exceeding a large shrub in the south, where it is only found in gardens. Medicinal properties are attributed to the leaves, fruit, and bark; and the sweetly fragrant flowers afford an essential oil. These flowers are rarely open during sunlight. See Indian tradition as to the cause of this in the *Pharmacographia Indica.* At Bangalore, the shrub is very subject to the attack of mildew, which, in a measure, spoils its effect. To succeed well, it requires a sheltered position, good drainage, and a deep alluvial soil.

362 Schrebera swietenioides, Roxb. *Coorg.* Kalgaute.

Fig.—*Bedd. Fl. Sylv. t. 248. Wight see. t. 162.*

References.—*Brand. For. Fl.; Fl. of Brit. Ind.*

A medium sized timber tree. Flowers in cymes of 100 or less, small, white with brown spots, opening during the night, when they are deliciously fragrant. Capsules large, woody and pear-shaped. Not uncommon in Coorg and probably extending to parts of the Malnad. Beddome says the wood is hard, close-grained, heavy and durable; also that it is used for looms and other articles by the people, and that it is well suited for the lathe. Forest officials would do well to collect fuller information as to the distribution and growth of this species. Herbarium specimens would also be acceptable at head quarters. Cultivation unknown, but most likely confined to the hills.

363 Linociera malabarica, Wall.

A small tree of the Western Ghâts. *L. intermedia,* Wight. is possibly found on the same range. The local merits of these trees are practically unknown.

364 Olea glandulifera, Wall and **O. dioica,** Roxb.

Nothing special can be said about these trees at present, further than that they exist in the evergreen forests of the western frontier. The Europe olive, *Olea Europea,* Linn. has been cultivated in the Lal-Bagh for 30 years, but has not fruited during that time.

365 Ligustrum robustum, Blume.

One of the Indian privets. Cultivated in the Lal-Bagh, but never attaining to the size of a tree. The creamy-white flowers are sweet scented and very useful for table decoration.

366 Ligustrum Roxburghii, Clarke.

Fig.—*Wight t. 1243.*

A small tree or shrub of the Western Ghâts. "Wood light-brown, rather close grained and durable; generally used at Mahableshwar in the construction of huts and for fuel." *Lisboa.*

Cultivation.—With plenty of moisture and deep garden soil, the above two species form attractive bushes. They are, however, inimical to long periods of dry weather.

367 Noronhia emarginata, Poir.

A small evergreen tree fo Madagascar. Cultivated in the Botanical Gardens, but not attaining to any size.

XLVII SALVADORACEÆ.

368 Azima tetracantha, Lamk. *Kan.* Bili wuppi.

Fig.—*Bot. Plates Lal-Bagh Collection*; *Lamk. Ill. t. 807.*

References.—*Pharm. Ind.*; *Dict. of Econ. Prod. of Ind.*

A common evergreen bush of the plains. 4 long, sharp spines are produced at every node, which give the bush a very formidable appearance.

Leaves elliptic, rigid, glabrous, and acute. Usually very small towards the ends of the shoots. Flowers small, white, in axillary clusters. Fruit sessile, globular, the size of a black currant, crystal-white when ripe; usually eaten by the village childern. Rare medicinal properties are attributed to nearly every part of this plant, but more especially to the leaves, roots and juice. The leaves are considered an unfailing stimulant for puerperal subjects when taken immediately after confinement, and are highly prized by the villagers on that account. For fuller information as to the medicinal value of the species, readers should see the works quoted above.

XLVIII APOCYNACEÆ.

369 Carissa Carandas, Linn. *Kan.* Korinda, Karinda, Karekai, In Hassan. Heggarjige.

Fig.—*Wight. Ic. t. 426. Bedd. Fl. Sylv. t. 19. f. 6.*

References.—*Pharm. Ind.; Dict. of Econ. Prod. of Ind.*

A thorny evergreen shrub of scrub tracts and the drier parts of the Malnad. Growing near support, it becomes a large woody climber. Well known for its delicious fruit, which is said, by Firminger, to be the best Indian fruit both for preserving and pickling. There are two or more varieties, in addition to the allied species, *C. spinarum*, and *C. macrophylla*, scattered about the country. The fruits vary in size from a small gooseberry to a plum. It is strange that a food-providing plant of this class is not more extensively cultivated in private gardens, where it could be formed into an excellent protective fence also. The wood is good for the turning lathe, being hard, smooth and fine-grained. The large white flowers are attractive and sweet scented. Medicinal properties are attributed to the bark, leaves, and fruit.

Cultivation.—With good soil and a little irrigation during the dry months, the different species thrive luxuriantly, and produce good crops of fruit. Propagate from seeds and layers. Inarching and grafting has not been tried, but it is well deserving of trial.

For making protective fences around gardens and fields, there could be nothing more suitable than *Korinda.*

370 Cerbera Odollam, Gaertn. *Tam.* Katarali, *Kan.* Honde.

Fig.—*Bot. Plates. Lal-Bagh. Collection. Wight. Ic. t. 441.*

References.—*Fl. of Brit. Ind.; Pharm. Ind; Dict. of Econ. Prod. of Ind.*

A small evergreen tree of swamps and back-waters near the sea. Cultivated in the Botanical Gardens, where it flowers and fruits freely. Flower large, white, rotate.

Fruit of one or two ovoid, ellipsoid, or testiculate carpels, the size of a mango. Good specimens are plentiful around the ornamental pond in the People's Park at Madras. The fruit and seeds are poisonous. Wood soft and of no value, only weighing 21 lb. per cubic foot.

371 Kopsia fruticosa, A. DC.

A large evergreen shrub of the low hill tracts. Ornamental, but otherwise unknown.

372 Plumeria acutifolia, Poiret. *Kan.* Deva ganagalu.

Fig.—*Bot. Plates. Lal-Bagh Collection. Wight Ic. t. 471. Bot. Mag. 3952.*

References.—*Dict. of Econ. Prod. of Ind.; Pharm. Ind.; Fl. of Brit. Ind.*

The Pagoda tree. This bush-like tree, with its numerous gouty-looking branches and handsome creamy flowers, is a familiar object in most Indian towns. It flowers profusely in the hot weather and is often planted in Christian burial grounds.

The bark and flowers possess medicinal properties which, however, should be applied with caution.

Cultivation.—Propagate from cuttings and plant out in any dry rocky position. Although but naturalised in this country, the species is remarkable for its long endurance of drought.

373 Alstonia scholaris, Brown. *Kan.* Jantala, Janthalla.

Fig.—*Wight. Ic. t. 422. Bedd. Fl. Sylv. t. 242.*

References.—*Dict. of Econ. Prod. of Ind.*; *Pharm. Ind.*

An evergreen tree of variable size. Mostly confined to the dry and subalpine forests of Mysore and Coorg. Leaves in whorls of 4—7, petiolate, elliptic-oblong, coriaceous, white underneath; average blade 7×2 in. Follicles 1—2 feet, in pendulous clusters, very slender. The wood of this tree is of little value, being soft and light—weight 28 lb. per cubic foot—but the bark and leaves are prized for their medicinal properties. The bark, which is astringent, antiperiodic, and anthelmintic, is known commercially as *dita bark*. It is not, however, an article of Indian commerce. The specific name *scholaris* has originated from the frequent use of the wood in Indian schools both as blackboards and sandplanks, on which native children trace their letters.

Cultivation.—Easily raised from seed and perfectly hardy in the drier forests of Mysore, where it is also self-productive.

374 Alstonia venenatus, Brown. *Kan.* Addasarpa.

Fig.—*Wight. Ic. t. 436.*

Reference.—*Fl. of Brit. Ind.*

A glabrous shrub at Nundydroog and towards the Eastern Ghâts. Leaves in whorls of 4—6, narrowly lanceolate and finely acuminate. Follicles stipitate and long beaked, slender, sword-shaped, nearly half a foot and usually in pairs. Uses unknown.

375 Holarrhena antidysenterica, Wall. *Kan.* Kodamuraka, Kodasiga, In Shimoga.—Kadgal marga?

Fig.—*Wight Ic. ts. 439. 1297. and 1298.*

References.—*Dict. of Econ. Prod. of Ind.*; *Pharm. Ind.*; *Fl of Brit. Ind.*

A small deciduous tree of the mixed and dry zones. Probably not very plentiful in Mysore. Growing behind the ramparts at Nundydroog.

It has been frequently confounded with species of *Wrightia* in different parts of India, and in this

province with *Wrightia tinctoria*, 'Beppale.' Dr. Geo. Watt has therefore done good service by publishing the diagnostic characters of the two genera, which the writer ventures to reproduce for the information of forest officials in this State.

Wrightia.	Holarrhena.
(1) *Corolla* not more than twice the length of the calyx, mouth surrounded by a corona or teeth.	(1) *Corolla* three or four times the length of the calyx; mouth naked.
(2) *Stamens* inserted within the mouth of the corolla, anthers protruding, twisted and surrounded by the corona.	(2) *Stamens* inserted at the bottom of the tube and therefore not protruding.
(3) *Seeds* straight, oblong, compressed, with a coma of hairs at the base, the apex being pointed and naked.	(3) *Seeds* linear, oblong, compressed, concave, with a coma of hairs on the apex.

If the last vernacular name applies to this species, which is open to question, the tree is used for fuel and manure in Shimoga, while the seeds yield an oil. In Bombay, the bark and seeds have a local market value, the former selling at Rs. 1—8 per maund of 37½ lbs. and the latter at Rs. 25 for the same quantity. More information is still wanted as to the local value of this tree, especially in regard to the utility of its medicinal bark, the merits of which are so much prized in other parts of India.

It is the true 'Conessi Bark' of commerce.

376 Tabernæmontana coronaria, Br. *Kan.* Nandi-battal or batlu.

Fig.—*Bot. Plates Lal-Bagh Collection. Wight Ic. t. 477.*

References.—*Dict. of Econ. Prod. of Ind.*; *Fl. of Brit. Ind.*

An evergreen shrub cultivated in the Lal-Bagh and other gardens for its beautiful flowers. The latter

are large, sweet-scented and pure white; double and single according to variety. It is commonly called the 'eye flower' owing to its being a good remedy for sore eyes. But the medicinal properties of the plant are mostly contained in the root, and in the milky juice which abounds in all the tissues. *T. dichotoma,* Roxb. and *T. Heyneana,* Wall. should be looked for in the Western Malnad. They are small milky trees having stout branches and attractive white flowers.

Cultivation.—*T. coronaria* is readily propagated from cuttings, but it does not produce seed at Bangalore. It makes a fine shrubbery bush, and thrives well during the rainy months of the year. Plant in ordinary garden soil, and irrigate occasionally when the rains cease.

377 **Vallaris Heynei,** SPRENG. *Kan.* Bugadi.

Fig.—*Bot. Plates Lal-Bagh Collection. Wight. Ic. t. 438.*

Reference.—*Dict. of Econ. Prod. of Ind.*

A woody climber of scrub and rocky tracts. The milk-sap is a popular local remedy for toothache and inflamed gums. The clustered cup-like flowers are attractive, deliciously fragrant, and pure white in colour. Often cultivated in gardens. Of indigenous climbers, this is one of the best.

378 **Wrightia tinctoria,** R. BR. *Kan.* Beppale, Hale.

Fig.—*Bot. Plates Lal-Bagh Collection. Bedd. Fl. Sylv. t. 241. Wight Ic. t. 444.*

References.—*Fl. of Brit. Ind.; Pharm. Ind.; Dict. of Econ. Prod. of Ind.*

A small deciduous tree which flowers very profusely at the close of the dry season. Tolerably common and well known in most parts of Mysore and Coorg. Often cultivated for its white fragrant flowers, which are offered at the Hindu shrines.

The wood is highly valued by native turners on account of its ivory-white colour and suitability for the lathe. It enters largely into the manufacture of the celebrated Channapatna toys, and to the wooden images found in temples.

"The leaves of this plant, which turn black when dry, afford a kind of indigo called in Mysore *Pala Indigo.* An account of the preparation of this dye appears in Buchanan's "Journey through Mysore &c.," 473. The coagulated milky juice forms a kind of caoutchouc; the wood is valued by turners who call it *Dudhi*; 'milk wood.," *Pharmacographia Indica.* The preparation of dye from the leaves of *Beppale* is an old but limited industry in Mysore. The bark and seeds are used medicinally, and are sold in the local bazaars.

Cultivation.—Easily propagated from seed, and quite hardy in all but absolutely barren soils. It is a suitable subject for poor soils and dry localities, although under the extremes of these conditions, it will rarely attain to more than a shrub.

379 Wrightia tomentosa, Roem. *Kan.* Kadu ganagalu.

Fig.—*Wight Ic. t. 443 and 1296.*

Reference.—*Fl. of Brit. Ind.*

A shrub or very small tree of the dry hills and plains. Herbaceous portions densely tomentose. Flowers larger than in the last species, 1 in. diam., pale yellowish with orange coronal scales. Full of a milky juice; and the sweet-scented flowers are used in *puja.*

380 Nerium odorum, Soland. *Kan.* Ganagalu., Kanigilu.

Fig.—*Bot. Plates Lal-Bagh Collection.*

References.—*Pharm. Ind.*; *Dict. of Econ. Prod. of Ind.*

The sweet-scented oleander. This stout evergreen shrub, of which there are several varieties, is both wild and cultivated in Mysore. It is

much prized for its large handsome flowers, which are offered at the shrine of *Siva* by Hindus, on account of their beauty and fragrance. Highly poisonous properties are found in the root, bark, and leaves, but a paste prepared from the root is a popular external remedy for several skin diseases. Being a powerful heart poison, the roots of the oleander are not infrequently used to commit suicide. Reduced to a fine powder, the bark and leaves are fatal to small vermin. The wood is practically of no value.

Cultivation.—The oleander affects depressions and ravines, where the water-level is near the surface, and where there is an accumulation of alluvial silt. In such positions, the species grows rapidly, and yields a profusion of fine flowers, in double and single varieties of several distinct colours. When the seeds are imperfect, which is often the case in Mysore, propagate by cuttings, layers, and offsets. The shrub is much cultivated in some parts.

381 Beaumontia grandiflora, Wall.

An extensive woody climber. Cultivated in gardens for its handsome white flowers. The latter are large, bell-shaped, and very useful for decoration. *B. Jerdoniana,* Wight. is somewhat rarer in cultivation, but equally effective while in flower. Both plants contain a thickish milk-sap, and the young shoots afford a fibre. A fine silky floss is also attached to the seed.

Cultivation.—Being mostly from the Eastern Himalaya, the genus requires a cool position and some protection from the sun. *Beaumontia* does well when planted in deep soil near a stream, and under the partial shade of large trees, over which it will subsequently cast its giant arms for support and protection. Propagate from seed and layers.

382 Thevetia neriifolia, Juss.

Fig.—*Bot. Plates Lal-Bagh Collection.*

The exile tree. Introduced from the West Indies and cultivated in this country. It is sometimes spoken of as the "yellow oleander" as the flowers are bright yellow, while the long linear-lanceolate leaves are not unlike those of the genus *Nerium*. It is, however, a much larger species, with a distinct, berried fruit, the size of a plum. Specimens may be seen in the Botanical Gardens, where they blossom freely during the rainy season. It is a poisonous plant, but preparations of the bark and seed are valued in medicine. It is said to be a good anti-periodic.

Cultivation.—The same as for oleander, to which the species is somewhat closely allied.

383 Allamanda cathartica, Linn.

An ornamental climber cultivated in gardens for its showy yellow flowers. Originally introduced from America by the Portuguese, which possibly accounts for its having run wild at Goa and other parts of the Western Coast. It is a poisonous plant having the reputation of being a good cathartic. Specimens may be seen in the Lal-Bagh, where it is grown as a bush.

Cultivation.—Treat as a shrub or climber in any good soil. The species is very hardy, but suffers from long exposure to drought. Propagate from seed and cuttings.

384 Ichnocarpus frutescens, Br. *Kan.* Kari hambu.

Fig.—*Wight Ic. t. 430.*

References.—*Pharm. Ind.; Dict. of Econ. Prod. of Ind.*

A wide spreading climber with dark-brown to iron-grey bark. Leaves dark green, variable in size, but never very large. Flowers, numerous, small, of a dirty whitish colour. The plant contains a milk-sap,

and its roots are medicinal. In some parts of India, the latter are considered to possess all the properties of the Indian Sarsaparilla, *Hemidesmus indica*, and are known by the same name, *Sariva*. The roots of the two plants are supposed to be used together in Indian pharmacy, but it is unknown to what extent this root is utilised by local herbalists, or, if it is sold in bundles like the *Sugandhi beru*. Exact statements on this point would be of value for a future issue of this work.

The *Kari hambu* is an extensive woody climber spreading over bamboos and large trees, while *Sugandhi balli* is a slender twiner clinging to rocks and small bushes. The roots of the last named are also very fragrant. Being of a tenacious and pliable nature, the young shoots of *Kari hambu* are popularly used to fasten thatch on to native houses.

385 Landolphia Kirkii.

A climbing plant introduced from Zanzibar. Also *L. Watsonii* and an unnamed species. These climbers, which may be seen in the Lal-Bagh, constitute the chief known source of African rubber. They grow well in the Bangalore climate.

XLIX. ASCLEPIADEÆ.

386 Hemidesmus indicus, BR. *Kan.* Sugandhi balli, Sogade, Karibanta.

Fig.—*Wight Ic. t. 594. Benth. & Trim. Med. Pl. t. 174.*

References—*Pharm. Ind.; Dict. of Econ. Prod. of Ind.*

Indian Sarsaparilla. A slender twiner of the maidan country. Mostly affecting low rocky hills and scrub tracts. The surface growth seldom attains more than 2—3 yards in diameter, but the roots spread far among the rocks, and are then difficult to

secure. The Hindus and Muhammadans have much confidence in the healing powers of this root, and apparently not without reason. It is sold in small bundles at the local rate of 2—4 annas each, but in many instances the article has been kept in the herbalist shop until its medicinal virtues are quite exhausted, so it is always safer to procure fresh roots from the field. The roots of *Sugandhi* are cylindrical, tortuous, dark brown in colour, with a fine odour of tonka bean when freshly gathered. In use, they are supposed to be associated with the roots of *Kari hambu*, Ichnocarpus frutescens, and together, these are considered demulcent, alterative and tonic. These roots are among the most important of native drugs, and seem to be worthy of fuller investigation as to their comparative merits.

Cultivation.—In nature, the plant clings to dry stony situations, where the roots penetrate far between the rocks, but under garden treatment it is never very robust. Propagate from offsets, planting the latter in rockeries, between stone boulders, and in the crevices of old walls.

387 Cryptostegia grandiflora, Br.

An ornamental climber running wild in a few places, but mostly cultivated in gardens for its pretty flowers. Supposed to be indigenous to Africa or Madagascar. The whole plant yields a milk-sap which coagulates rapidly on exposure to the air. The beautiful pinkish-purple flowers usually appear with the south-west monsoon.

Cultivation.—Seeds locally gathered rarely germinate, but the plant is not difficult to raise from offsets and cuttings, the latter being placed in a glass frame with a little bottom heat. A deep sandy loam, possessing sufficient moisture all the year round, is a good medium for the cultivation of this climber.

388 Secamone emetica, BR. *Kan.* Siranige hambu.

A slender twiner found at Kankanhalli and elsewhere. Dr. Bidie thinks it is of little value as an emetic. The root development of this plant exceeds that of the stem and leaves.

389 Oxystelma esculentum, BR. *Sans.* Tikladugdha, Dughdika.

This is also a slender twiner of the plains having smooth deciduous leaves. The fruit is edible, and a few medicinal properties are attributed to the species. Flowers white and rose-coloured with purple veins.

390 Calotropis gigantea, BR. *Kan.* Yekkada, Yekka.

Fig.—*Bot. Plates Lal-Bagh Collection.*

References.—*Fl. of Brit. Ind.*; *Pharm. Ind.*; *Dict. of Econ. Prod. of Ind.*

The Mudar or giant swallow-wort. A conspicuous, woolly, evergreen shrub of the plains. Abundant in waste land, by the sides of nullahs and along the margins of cultivated fields, where it attains a height of 4—7 feet. The whole plant abounds in a thick milk-sap which coagulates quickly into a solid body on exposure to light. This substance possesses some of the properties of gutta percha, but being a conductor of electricity, is unsuited for the manufacture of cables, and its chief use is in native medicine. The root, milky juice, bark, and flowers, are all prescribed as Indian drugs, and the people seem to attach considerable importance to the medicinal properties of the whole plant. It also affords two kinds of fibre, one consisting of the inner bark, and the other of the fine hairs which invest the seed. The latter is commercially known as "Madar floss" and is worth 5*d* a pound in the London market. An attempt was made some years ago to collect a quantity of this floss for consignment

to the London brokers, but the quantity received at head quarters was insufficient to encourage export, although the shrub is very plentiful in most of the maidan districts. The floss finds its way to Europe and America, where it is appreciated for fancy work. A white bast fibre is obtained from the liber or inner bark. It seems strange that a plant possessing so many useful properties cannot be utilised commercially for the benefit of the State. There are two varieties, one having large purple, and the other large creamy-white flowers, the latter being commonly used as temple offerings. The species is self-productive from seed and offsets.

391 Asclepias curassavica, Linn.

An undershrub cultivated in gardens for its pretty orange and crimson flowers. In botanical works, it is usually described as a herb or weed, but at Bangalore, it forms a woody base, and is distinctly suffruticose. The species is indigenous to the West Indies, Central and Tropical America, where it is known as "Red Head" and "Wild Ipecacuanha." The root possesses emetic, purgative, and other properties, and is considered a remedy in piles and gonorrhœa. The juice of the leaves is useful in arresting hæmorrhage, and the juice of the flower is a good styptic. Specimens may be seen in the Botanical gardens, where the plant thrives without much attention. The seed germinates pretty freely.

392 Dæmia extensa, Br. *Kan.* Juttuve, Kuntiga, Talavarana balli, Hala koritige.

Fig.—*Bot. Plates Lal-Bagh Collection. Wight Ic. t. 596.*

References.—*Dict. of Econ. Prod. of Ind.; Pharm. Ind.*

This is a fœtid climber found somewhat sparsely in most parts of the province, but especially in

jungle tracts skirting the intermediate and drier hill ranges. The leaves of the plant are highly esteemed in native medicine, and are generally used for the ailments of children, their properties being mostly emetic and expectorant. In good situations, the species attains a large size, and affords from its inner bark, a delicate fibre which has been recommended as a substitute for flax. Under cultivation, the plant would attain greater development than it does in the wild state, where it is much pollarded by goats and men. Strange to say, sheep do not browse upon it.

393 **Sarcostemma brevistigma,** WIGHT. *Kan.* Hambu kalli.

Fig.—*Wight Ic. t. 595.*

References.—*Dict. of Econ. Prod. of Ind.; Pharm. Ind.*

A leafless trailer having cylindrical stems with many joints. Flowers in small clusters, white. Plentiful at Nundydroog, where it hangs over the rocks. The whole plant affords a bland milky juice which is used in medicine. It is said to be a substitute for the *Soma* of the Vedas. Commonly found in dry rocky situations, and cultivated in the Botanical gardens.

394 **Gymnema sylvestre,** BR. *Kan.* Sanna gerse hambu.

Fig.—*Wight. Ic. t. 349.*

A wood climber of the dry zone. Abundant at Kankanhalli, where it will be found growing over the highest clumps of bamboo. The powdered root of this plant is considered an antidote for snake bite, being applied externally at the same time that a decoction is given internally. The leaf possesses the remarkable property of destroying the sense of taste for saccharine substances, such as sugar. This was first noticed by Mr. Edgeworth, and afterwards confirmed by Mr. D. Hooper, Quinologist with the

Government of Madras. Although very common in some parts of Mysore, the species has not attracted local notice as a medicine plant.

395 **Tylophora asthmatica,** W.&A. *Kan.* Adumuttada gida.

Fig.—*Wight. Ic. t. 1277; Bentl. & Trim. t. 177.*

References.—*Dict. of Econ. Prod. of Ind.; Pharm. Ind.*

An abundant twiner found in waste land and among rocks and scrub. It is valued for its emetic and cathartic properties, in which it nearly equals Ipecacuanha. The root and leaves are the useful parts, the former, reduced to powder, being a popular medicine for cattle.

L. LOGANIACEÆ.

396 **Fagræa obovata,** Wall. *Kan.* Ginnunu?

Fig.—*Wight Ic. t. 1316 & 1317.*

Reference.—*Dict. of Econ. Prod. of Ind.*

This is an evergreen tree, shrub, or climber, according to situation. Specimens may be seen in the Lal-Bagh, where they are cultivated for their attractive flowers and fruit. The flower is long, tubular, bell-shaped at the mouth, and cream-coloured. Fruit the size and form of an egg. Wood hard and durable, but always small on the plains. Weight 56 lb. per cubic foot. The species is indigenous to the Malnad, where it is very showy.

Cultivation.—The requirements of this evergreen are a subtropical situation, virgin forest soil, and plenty of water. It is easily propagated from cuttings.

397 **Strychnos Nux-vomica,** Linn. *Kan.* Nanjina Koradu, Mushti, Hemmushti, Kasarka.

Fig.—*Bedd. Fl. Sylv. t. 243; Bot. Plates Lal-Bagh Collection.*

References.—*Fl. of Brit. Ind.*; *Dict. of Econ. Prod. of Ind.*; *Pharm. Ind.*

The poison nut. A middle-sized evergreen tree, with fruit the size and form of a small apple. Common in Coorg and South Western Mysore, but not very abundant elsewhere. The poisonous nature of the seed, which affords strychnia, is well known. It is also said that the leaves are fatal to horses, although the pulp of the fruit is generally eaten by birds and vermin. The root, stem, bark, and seeds are used in medicine. It is reported by the Sub Assistant Conservator of forests, Shikarpur Sub Division, that the root-paste, formed on a wet stone,—*gandha*—is considered to be a good stimulant in cases of prostration. Wood hard, brownish-grey, splits and warps when seasoned. Not uncommonly used for fuel when procurable.

Cultivation.—In poor soils, the growth of *Mushti* is usually slow, but when the trees are manured and watered they develope more rapidly, and bear fruit in from 10 to 12 years. Seedlings should be planted in large pits of loose soil at the commencement. 75 per cent of the seed is unfertile at Bangalore.

398 Strychnos potatorum, LINN. *Kan.* Chill, Chillu, Chilla.

Fig.—*Wight Ill. t. 156.*

References.—*Fl. of Brit. Ind.*; *Dict. of Econ. Prod. of Ind.*; *Pharm. Ind.*

The clearing-nut tree. Smooth, evergreen, of small or medium size, often felled for fuel. From a very remote period, the ripened seeds of this tree have been used in India for clearing muddy water. The species is perhaps best known by its Sanskrit name *kataka*, the merits of which are handed down in the oldest Hindu writings. It is mostly confined to the subalpine regions of Mysore, where, however,

it is never abundant in any one place. The pain arising from the sting of a centipede is quickly allayed by rubbing a seed to powder, and applying the latter to the affected part in the form of a paste.

The scandent species, *S. colubrina*, Linn. and *S. Dalzellii*, Clarke, should also be found on the western boundary of Mysore. Excepting that it requires a slightly cooler situation, the treatment of *S. potatorum*, in cultivation, is the same as for number 397.

399 Buddleia asiatica, Lom.

Fig.—*Bot. Mag. t. 6323*; *Wight. Ill. t. 165*; *Wight Ic. t. 894.*

An attractive shrub or small tree of the higher evergreen range. Useful in gardens, where it keeps in blossom for 2—3 months. The small tubular flowers—white in colour—are rather densely packed in simple or branched racemes. The latter appear mostly at the ends of the branches, and are sweetly scented.

LI. BORAGINEÆ.

400 Cordia Myxa, Linn. *Kan.* Solle, Chotte, Kendal, Kendala, Chella ? Challe ?

Fig.—*Bedd. Fl. Sylv. 245, fig. A.*; *Wight Ill. t. 169.*

References.—*Dict. of Econ. Prod. of Ind.*; *Fl. of Brit. Ind.*

A deciduous tree of ugly form and middle size. There are three local varieties known respectively as *kadu solle*, *kempu solle*, and *solle kendal*. These are determined by the size, form, and colour of the fruit, the latter being well known to old settlers as the Sebesten of commerce. The mucilaginous berry is globular or oval, and varies in size from a cherry to a large bean. Cowherds and village children eat the fruit, but it is not very palatable, and is much too

plentiful to be relished as a food product. Dried fruits have mucilaginous and demulcent properties, and are recommended for coughs and chest affections. In the raw fruit, the mucilage is so abundant and sticky that juveniles use it for gumming their kites and such like. Lovery gives the following account of the tree :—"A middle-sized tree of quick growth. Wood greyish or light brown, soft, porous, seasons well and is fairly strong; but does not stand exposure and is attacked by insects. Used for agricultural implements, sugar-cane mills, boat-building, and fuel. Bark made into ropes." The bark has also medicinal properties.

Cultivation.—Seeds do not appear to be self-productive under the trees, although they germinate readily in a nursery-bed. Planted in ordinary loose soil, the seedlings usually grow rapidly. The species is unsuited for avenue or ornamental work.

401 Cordia obliqua, WILLD. *Kan.* Chadle, Dodda Challu.

Fig.—*Wight Ic. t. 1378.*

A deciduous tree closely resembling the above species, and having nearly the same properties. The flowers are larger, and the herbaceous parts of the whole plant are densely hairy.

402 Cordia Rothii, ROEM. *Kan.* Narvalli, Narvilli, Narivuli.

Fig.—*Wight Ic. t. 1379.*

Reference.—*Brand. For. Flora.*

A small deciduous tree of 30 feet. Not uncommon in the dry forests of the Mysore District and at Savandroog. The bark affords a coarse fibre which is utilised for domestic purposes. *Cordia monoica*, ROXB. *C. fulvosa*, Wight. and *C. subcordata*, Lamk. are also found in various parts of the province. The last named has been introduced from the

Andaman Islands, and is occasionally cultivated in gardens for its attractive orange flowers.

403 **Ehretia lævis,** Roxb. *Kan.* Kappura, Halippe, Avak ?

Fig.—*Wight. Ic. t. 1382. Bedd. Fl. Sylv. t. 244.*

References.—*Fl. of Brit. Ind.*; *Dict. of Econ. Prod. of Ind.*

A middle-sized tree of the plains, where it is mostly found on low hills and in the scrub jungle. The fruit and inner bark are eaten during times of scarcity, and cattle are reported to be fond of the leaves at all times. The wood is tough and durable, and is frequently utilised for rural structures, farm implements, and such like.

The "Flora of British India" enumerates no less than five varieties of the species, so variable is its character under different conditions of soil and aspect. One of these varieties is probably the *kodali murka*, or *kodgol marga*, which affords on oil from its seed. It is desirable that fuller enquiry should be made on this point, and that good herbariun specimens of all the kinds are collected for identification. The variety, *E. lævis pubescens*, is common on the plains, while *E. lævis aspera* affects somewhat higher altitudes.

404 **Ehretia Wightiana,** Wall.

A tree of the maidan of which little is known. Supposed to be commonly used for fuel.

405 **Ehretia buxifolia,** Roxb. *Kan.* Yennebudige. *Tam.* Kuruvingi.

Fig.—*Roxb. Cor. Pl. i. 42, t. 57.*

References.—*Flora of Brit. Ind.*; *Pharm. Ind.*

A medicinal shrub of dry forest and scrub tracts. Among Muhammadans, the root has the reputation of being an antidote to vegetable poison. It is also used for the cure of venereal diseases.

LII. CONVOLVULACEÆ.

There are no trees of this Order in Mysore. But the reserved forests abound in numerous species of *Ipomæa*, *Argyreia* and *Lettsomia*, many of which, by reason of their quick development and investing nature, are exceedingly injurious to the growth of young trees. These twiners not only grow with extraordinary rapidity, but also lay hold of, and coil themselves around and over, every other plant within their wide range of growth. It is not surprising, therefore, that small trees suffer to a large extent when such aggressive twiners are allowed to spread. The large campanulate flowers are always attractive, and seen trailing over a succession of bushes, or, festooned from one tree to another, they afford a striking picture. These, with a few species possessing medicinal properties, are here briefly mentioned. For a full account, the reader should consult that excellent work "Pharmacographia Indica."

406 Argyreia speciosa, SWEET. *Kan.* Samudrapala.

The elephant creeper. This climber often ascends to the tops of the highest trees. The leaves and root are the parts used.

407 Lettsomia sp, *Kan.* Oogani hambu.

This is the commonest ground creeper of waste land. The juice of the plant is popularly applied to bruises, and the tough pliant stems are used by the raiyats in lieu of ropes for tying up bundles of field or forest produce.

408 Ipomæa Turpethum, BR. *Kan.* Bilitigadu, Tigadikeputigadi.

Furnishes *Turpetti root*, or Indian jalap.

409 Ipomæa hederacea, JACQ.

Known to Europeans as "morning glory," and often cultivated in gardens for its sky-blue flowers. The seeds are looked upon as a sure cathartic.

410 Ipomæa muricata, JACQ.

A prickly twiner of annual duration like the last named, and possessing the same medicinal property. Flowers purple and white.

411 Ipomæa digitata, LINN. *Kan.* Bhumichekri gadde, Buja-gumbala.

The prepared root of this creeper is utilised with milk and honey as an aphrodisiac; and combined with coriander and fenugreek, it becomes a lactagogue.

412 Ipomæa biloba, FORSK. *Kan.* Adambu balli.

This is the goats-foot creeper of the Madras shores. The root and leaves are medicinal, and the flowers are sacred to the goddess *Durgi.* Being a maritime plant, it does not succeed very well in an insular country like Mysore; but with this exception, the various species of *Ipomæa* are easily produced, and form an interesting collection for trellis work.

413 Evolvulus alsinoides, LINN. *Kan.* Vishnukranti, Vishnukrandi.

Fig.—*Bot. Plates Lal-Bagh Collection.*

A low procumbent herb of the woods and fields. The pretty, little, blue flowers remind one of forget-me-not, to which they bear some resemblanee. It is a popular herb, to which several valuable properties are attributed by the people of India. Indeed so great is the belief in its curing power that, in some parts, it is taken for nearly every complaint. "At the present time it is thought to strengthen the brain and memory, and is used extensively as a febrifuge and tonic. Burmann says that it is reputed to be a sovereign remedy for dysentery."

Pharmacographia Indica.

The tender leaves make a fine chatney which is much relished by the Hindus. It is mostly consumed with ghee and rice.

414 Cuscuta reflexa, Roxb.

The dodder or horse-tail parasite. This injurious plant is fortunately not very common in the State forests. But in some parts of India it does much damage to trees, growing in dense fleshy masses all over the trunk and limbs of its host.

The small whitish flowers are very fragrant.

LIII. SOLANACEÆ.

415 Solanum arboreum, H. & B.

Fig.—*Bot. Plates Lal-Bagh Collection.*

The potato tree. A small soft-wooded species of quick growth. Introduced originally from South America, and cultivated in gardens for its showy blue and white flowers. A very effective flowering tree, but usually short-lived.

The herbs and shrubs named in the following list are commonly found in the woods and fields. They possess medicinal properties, of which details are given in *Pharmacographia Indica.*

416 Solanum indicum, Linn. *Kan.* Gulla, Kempu Gulla.

The fruit and root.

417 Solanum nigrum, Linn. *Kan.* Kari Kachi, Kempu Kachi.

The whole herb in fruit.

418 Solanum xanthocarpum, Schrad. *Kan.* Nela gulla.

The whole plant.

419 Solanum trilobatum, Linn.

A creeper with blue flowers. The whole plant.

420 Solanum verbascifolium, Linn. *Kan.* Savdangi.

421 Solanum torvum, Swartz.

A shrub with white flowers and yellow fruit.

422 Solanum ferox, Linn. Also with white flowers and yellow fruit.

423 **Withania somnifera,** DUNAL. *Kan.* Hiremaddina.
The root and leaves.

424 **Datura stramonium,** LINN. *Kan.* Bili ummatti, (white flowered) Kari ummatti, (purple flowered.)
Fig.—*Bentl. and Trim, t. 192.*
The thorn apple.

425 **Datura fastuosa,** LINN.
Fig.—*Wight Ic. t. 1396.*
Common throughout India, and known by the same vernacular names.

426 **Datura Metel,** LINN.
Fig.—*Bot. Mag. t. 1440.*
Known by the same vernacular names as the other species.

Datura poisoning is not uncommon in India, where the *dacoits* are known to use the seed-powder to stupify their victims with a view to committing robbery. The usual practice in such cases is to insinuate a small quantity of *Datura* powder into the food ingredients, sweetmeats, or tobacco of fellow travellers, who, for sometime previously, have been marked as victims. Administered in this way, 25 grains of fine powder is considered sufficient to render a full grown man quite insensible for several hours. Unfortunately this poisonous genus seeds but too freely all over the country. The thorn apple, *D. stramonium*, is a weedy rank-smelling annual, 3—4 feet with large indented leaves, and white or purple flowers. It is much at home on heaps of refuse and by the sides of manured fields. Being very self-productive, it would be difficult to eradicate even if Government offered a reward for its destruction, as it does in the case of animal pests.

427 **Nicotiana Tabacum,** LINN. *Kan.* Hogesoppu.
Tobacco. A large herb cultivated in dry fields, but supposed to be indigenous to some part of central or South America. The cured leaves afford tobacco.

LIV. SCROPHULARINEÆ.

428 Verbascum Thapsus, LINN. *Kan.* Kadu hogesoppu.

This is the 'Mullein' of Europe. It is found abundantly at Nundydroog, but is probably not wild in many parts of the province. The vernacular name given above signifies 'jungle tobacco.' The root, leaves, and flowers are medicinal.

429 Herpestis Monniera, H. B. et. K. *Kan.* Niru bramhi.

Fig.—*Bot. Plates Lal-Bagh Collection.*

Reference.—*Pharm. Ind.*

A medicinal herb found in marshy ground. Common in most parts of the country and considered to be an excellent diuretic. Anslie says "it is useful in that sort of stoppage of the urine which is accompanied by obstinate costiveness." The herb is found in the vicinity of Bangalore.

LV. BIGNONIACEÆ.

430 Millingtonia hortensis, LINN. *Kan.* Biratu, Beratu.

Fig.—*Bot. Plates Lal-Bagh Collection. Bedd. Fl. Sylv. t. 249.*

References.—*Fl. of Brit. Ind.; Dict. of Econ. Prod. of Ind.*

The Indian cork-tree. Indigenous to Burmah, the Malay Archipelago, and possibly Central India. Cultivated in Mysore. In good situations, this fine species attains a maximum height of 80 feet; erect in growth, columnar to conical in form, and very ornamental while in flower and leaf. The tall trunk is encased in a corky bark from which inferior cork is said to be manufactured in Burmah. Branches drooping. Leaves compound, 2—3 feet, deciduous in the dry season. Inflorescence in ample drooping panicles of large, white, tubular, fragrant flowers, September and October being the flowering months.

These characters render the species desirable for avenue and scenic planting. Wood soft, whitish, but taking a good polish; durable when fully seasoned and kept dry. Weight 40—45 lb. per cubic foot.

Cultivation.—In local growth, the seeds are rarely matured and do not, therefore, germinate. But the root stems throw out numerous suckers from which the tree is readily multiplied. When nicely rooted in pots, and a foot or more in height, these offsets can be planted out permanently at distances of 25 to 30 feet apart. Growth is somewhat slow in the beginning unless the soil is made quite loose and friable, when the result will be more satisfactory. The tree coppices fairly well, and the underground portion retains vitality for years after the visible tree has been removed. This somewhat remarkable property is not unusual among trees of the *Bignoniaceæ*, and appears to be associated with the fact that several of these trees are readily propagated from root-cuttings.

431 Oroxylum indicum, VENT. *Kan.* Tigdu, Sonepatta, Teta.

Fig.—*Wight Ic. t. 1337.*

References.—*Dict. of Econ.Prod. of Ind; Pharm. Ind.*

A small or middling-sized tree. Remarkable for the large size and striking form of its leaves, flowers, and fruit. Leaves deciduous in the dry season, opposite, 2—3 pinnate, 3—4 feet. Flowers appearing in erect terminal panicles during the S. W. monsoon; when unfolding, they are almost quite black, but quickly change in the open flower to a dark lurid purple. The pod is sword-shaped, blackish-brown, flat and 12—15 inches. Wood soft, weighing only 30 lb. per cubic foot. The root-bark possesses important medicinal properties, which give it a high place in the *Materia Medica* of this country. A bath prepared with this bark in it, is said to be a good remedy for rheumatism.

Reduced to a paste, and mixed with an equal quantity of turmeric, it forms an excellent plaster for sores and abrasions, and is much used by the raiyats in this capacity for their draught cattle.

Cultivation.—Plant seedlings of one year's growth in any loose soil of ordinary quality. The tree is perfectly hardy, and sheds fertile seeds annually after the tenth year of growth.

432 Bignonia venusta, Ker.

This woody climber has been introduced from South America, and is locally known as the 'orange-flowered creeper. Trained over porch trellises, it is a common feature of the Bangalore gardens.

433 Tecoma stans, Juss.

A small tree which is cultivated in Indian gardens for its bright orange-yellow flowers. Usually with a short crooked trunk, or reduced by pruning or position to a mere bush. In the latter form, it will be seen on the ramparts of the Bangalore Fort, where it is abundantly established, possibly through the agency of birds or vermin that devour the seed. Although small, the wood is durable, and takes a nice polish. Introduced originally from South America. *T. velutina,* Hort. from Australia, and *T. grandiflora* from China are cultivated in the Botanical gardens. The last named possesses a very striking inflorescence.

434 Dolichandrone falcata, Seem. *Kan.* Uddi ? Udi ? Uba ?

Fig.—*Bedd. Fl. Sylv. t. 71.*

References.—*Dict. of Econ. Prod. of Ind.*; *Pharm. Ind.*

A small deciduous tree of the maidan and sub-alpine districts. A coarse fibre of a darkish colour is obtained from the inner bark, and the heartwood is hard enough to be employed for implements and village buildings. Some part of the tree is supposed

to procure abortion, and the authors of *Pharmacographia Indica* assume that it may be the woody capsule. It is doubtful if the bark is ever used in this province to poison fish. *D. Rheedii* is found east of the Western Ghâts.

Cultivation.—This tree grows somewhat slowly even in the best soils. But it is very hardy in times of drought, and may be safely planted in the driest localities. It flowers in February or March, and ripens seed in July.

435 Spathodea campanulata,

Fig.—*Bot. Plates Lal-Bagh Collection.*

For ornamental planting, this tree is one of the most effective. Deciduous for a few weeks in the dry season, after which it breaks into leaf and is subsequently covered for a long period, (September and October) or two long periods, if the season is favourable, by a gorgeous display of large orange-crimson flowers. Fine specimens of the tree may be seen at the Lal Bagh, Cubbon Park, and Daria Dowlet Bagh. The bag-like flower bud contains a quantity of watery liquid, and when pinched at the apex, so as to form a small aperture, it becomes a water squirt, the utility of which is much appreciated by local juveniles. The nature of the wood is unknown. Don mentions that *S. campanulata* is indigenous to the West Coast of Africa, in the Kingdom of Waree.

Cultivation.—Made-up soils, and deep sandy loam are the most favourable for this species. Planted in some recently filled well, hollow, or ravine, it grows rapidly, attaining a height of 30—40 feet within a decade. But when the subsoil is hard and intact, growth is less satisfactory. With the exception of one old specimen in the Botanical gardens, which has borne a few solitary capsules, local trees do not produce seed; but cut into short sections, the root-branches give off numerous suckers from which nursery stock is raised. When laid under a thin

covering of sand and kept moist, these root-cuttings soon begin to sprout.

As an ornamental flowering tree, the *Spathodea campanulata* is second to none, but as it sheds large quantities of flowers for several weeks during the two periods of flowering, it is advisable to keep it apart from wells and ponds. For permanent growth, whether in avenues or clumps, the species should be planted at 50 feet apart.

436 Heterophragma adenophyllum, SEEM.

Fig.—*Wight Ill. t. 160.*

Reference.—*Dict. of Econ. Prod. of Ind.*

A small deciduous tree of subalpine regions. Wood moderately hard, and weighing about 40 lb. per cubic foot. Economic uses unknown.

Inflorescence densely hairy or almost woolly while in bud; flowers large brownish-yellow. Not uncommon in the Closepet Taluk. *H. Roxburghii,* DC. a larger tree of the same genus having rose-coloured flowers. Should be looked for in the mixed zone skirting the hills. These trees are recognised by their showy flowers, long pod-like capsules and winged seeds. A specimen of the first named will be seen in the Lal-Bagh.

Cultivation.—The same as for *Spathodea,* only that stock can be raised from seed. It is not known if root cuttings will develope buds and shoots as they do in the cases of *Spathodea* and *Millingtonia.*

437 Stereospermum suaveolens, DC. *Kan.* Padari? *Hind.* Padari.

Fig.—*Bot. Plates Lal-Bagh Collection. Wight. Ic. t. 1342.*

References—*Fl. of Brit. Ind.; Dict. of Econ. Prod. of Ind.; Pharm. Ind.*

A large deciduous tree frequenting the moist parts of the country, but rarely ascending much over 3,500 feet. The species begins to lose its leaves in

January, and is usually quite bare during the months of February and March, after which it sends forth, some days in advance of the young leaves, a very profuse crop of sweetly fragrant flowers of a lightish or rosy-purple colour, having a pale or yellowish throat. A peculiarity of the flower is, that it retains its fragrance for some days after it is faded, and is consequently much valued for making garlands, especially by the Muhammadan people. Capsule 12—15 in. stout, rough, copiously marked by whitish tubercles and slightly 4-ribbed; seed embedded in notches of the septum, deeply notched at the middle. In Malabar and the Concan, the tender flowers and fruit are esteemed as vegetables. Bees are passionately fond of the honey contained in the nectary of this flower, and are supposed to prefer it to any other. Medicinal properties are attributed to the root, leaves, and flowers; and as the vernacular name—priest tree—implies, the species is held in some veneration by the people of the country. Wood orange-yellow, to reddish brown in the centre, said to be elastic and durable, used in Assam for making tea-boxes. Large trunks are also hollowed out as canoes in the north of India. The species is often confounded with *S. chelonoides*, on which account it is very desirable that the description, quality, and local utility of both timbers, should be thoroughly worked out in the field. To enable forest officials to do this effectively, they should first identify their trees either by submitting botanical specimens to a competent botanist, to be named and returned, or, by studying the descriptions of Hooker and Brandis on the spot. This is all the more necessary as it is believed that the State forests contain one or two distinct forms of the two species here referred to.

Cultivation.—Virgin forest soil is undoubtedly the most suitable for this tree, but it also grows well in

the deep loam of the Lal-Bagh, where two fine specimens may be seen in the tope skirting the north end of the band promenade. Seeds collected from these trees have not germinated, but propagation is effected by the careful removal of offsets and suckers. Root-cuttings will also grow in moist sand. In favourable situations, the *Padri mara* attains a height of 80 feet, with 30—40 feet of clean trunk.

438 Stereospermum chelonoides, D.C. *Kan.* Padri, Kul Wudi?

Fig.—*Wight Ic. 1341. Bedd. Fl. Sylv. t. 72.*

References.—*Brand. For. Fl.*; *Fl. of Brit. Ind.*

A lofty tree of the Malnad and adjacent moist region. Leaves deciduous or subdeciduous in March and April. Flowers in loose panicles at the ends of the young shoots, and partly concealed by the leaves which appear with them, yellow inside, brownish outside, fragrant, but not to the same extent as the flowers of *S. suaveolens*, than which they are smaller, less prolific, and as a whole, less attractive. A specimen in the Botanical Gardens flowers in June. Capsule 15—20 in. quadrangular, glabrous, flexible, slender, and not so woody as in the foregoing species; slightly tortuous or sinuate. It is supposed that the species is not very abundant in the State forests, but this is open to question, and may be due to the fact that two different trees are often referred to by the same vernacular name.

Mr. Graham Anderson gives the following interesting account of the tree under notice:—

"An immense, deciduous tree; rough, dark brown bark with irregular cracks and deep horizontal seams. Flower, like a small snap-dragon, brown outside and yellow inside, three tiny leaflets (lobes of the corolla) of a light yellow colour forming the tongue.

Seeds are contained in a long, slender pod, and look like a piece of pith which has been pinched at every half inch of its length.

This tree sends out large roots to a distance of over fifty yards. When left in virgin soil, coffee will grow right up to its stem, but sometimes a complete circle of coffee dies out around it, and it is almost impossible to grow vacancies.

The wood is tremendously hard, and almost indestructible under water. Sawyers refuse to saw it. It is used for beams and posts, has a fibrous texture, and generally several axes are ruined in felling a single large tree. It makes splendid helves for axes, adzes, &c."

Gamble confirms the statement that the wood is very hard, a condition which, with its quality of great endurance under water, should be of interest to Engineers.

Brandis speaks well of the wood, adding that the bark, leaves, flowers, and fruit are used in native medicine. The fragrant flowers are possibly gathered for domestic and temple offerings, although they are not so popular in this respect as the rosy-purple flowers of *S. suaveolens.*

Cultivation.—In local cultivation, the species grows somewhat slowly, and the only advantage possessed over *S. suaveolens* is, that it is scarcely ever quite bare of leaf. Propagation is the same for both trees, as also the treatment in general.

439 **Stereospermum xylocarpum,** WIGHT. *Kan.* Konana kombu mara, Ghansing.

Fig.—*Bot. Plates Lal-Bagh Collection. Bedd. Fl. Sylv. t. 70.*

References.—*Pharm. Ind.*; *Dict. of Econ. Prod. of Ind.*; *Fl. of Brit Ind.*

A deciduous tree of small or medium size according to position. Indigenous to the hills and cultivated in the Botanical Gardens. Leaves bipinnate, very large, 2—4 feet, light green in colour. Flowers in terminal, erect panicles, which precede the

young leaves in March; corolla large, white, fragrant and fugacious, usually strewing the ground immediately under the tree. Capsule 20—30 in., tubercular, rugged and more or less crooked, especially towards the apex. Altogether a remarkable looking fruit which arrests attention. The vernacular name, *konana kombu*, has reference to the fruit, which, in occasional specimens, is not unlike a buffalo's horn. The tree is bare of leaf in February or March for about a month.

"The natives, by a rough process of the same nature as that by which tar is obtained from pine wood, extract from the wood a thick fluid of the colour and consistence of Stockholm tar, which they use as a remedy for scaly eruptions on the skin. Two globular earthen pots are used, the upper contains the wood in small pieces; it has a perforated bottom, and is fitted with a cover, and is luted to the mouth of the lower pot. Cow-dung cakes are then piled up round the two pots and set fire to. Dr. Gibson appears to have been the first to draw attention to the use of this substance by the natives. From some trials which we have made with it, we conclude that its properties are similar to those of pine tar. The tar has exactly the odour, colour, and consistence of Stockholm tar."

Pharmacographia Indica.

The product described in the above extract does not appear to be known in Mysore.

Cultivation.—Propagate from oldish seeds which have matured for nearly a year. When well preserved in a dry room, such seeds will germinate within five weeks from time of sowing, whereas newly gathered seed rarely germinates at all. Plant seedlings in ordinary garden soil at 20 feet apart. Some irrigation will be required during the first dry season at least.

440 Stereospermum sp. *Kan.* Kadu honge.

A small tree of the Malnad. Not fully determined. Herbarium specimens would be acceptable at head-quarters.

441 Catalpa speciosa, JUSS.

This Californian tree has been cultivated in the Lal-Bagh for some years without success. It possibly requires a moister climate.

442 Crescentia cujete, LINN. and **C. alata**, H., B. & K. West Indian calabash trees. These are confined to Botanical Gardens in South India, where they grow indifferently.

443 Kigelia pinnata, DC.

This magnificent tree may be said to have passed the introductory stage, as it is now freely employed in large towns to form groves and avenues. The large cylindrical fruit, suspended by a long rope-like peduncle, is a characteristic feature of the species. It is abundantly produced on local trees, and is not unlike a gigantic sausage, both in outline and colour. Introduced from the West Indies and tropical America. Economic properties unknown.

Cultivation.—Easily raised from seed. Growth rapid in deep open soils, but slow and stunted when the subsoil is hard, stiff, or unfertile. Defoliating twice during the year, but never quite bare of leaf. Plant at 45—50 feet apart, in large pits.

LVI. ACANTHACEÆ.

The following shrubs may be included as possessing medicinal properties of more or less value. They grow abundantly in waste land, and are generally well known to the peasants.

444 Barleria Prionitis, LINN. *Kan.* Gorati, Goratige.

445 Justicia Gendarussa, LINN. *Kan.* Natchu kaddi.

446 Ecbolium Linneanum, KURZ. **Adhatoda vasica**, NEES. *Kan.* Adusoge.

447 Rhinacanthus communis, NEES. *Kan.* Dodda patike gida.

LVII. VERBENACEÆ.

448 Lantana indica, Roxb. *Kan.* Kadu jola gida.

An indigenous shrub sparsely found in waste tracts. The purple berries are densely packed on short spikes, and hence the resemblance on a small scale to *jola*, *makka cholum*, or what is more generally termed Indian corn. Village children are said to eat this fruit. Flowers white, pink or pale purple, with a yellowish throat.

449 Lantana camara, Linn. *Kan.* Nata hu gida.

Fig.—*Bot. Plates Lal-Bagh Collection.*

References—*Dict. of Econ. Prod. of Ind.*

This introduced shrub has run wild in Coorg, South Wynaad, Hunsur, and various parts of the country. When properly looked after, it quickly forms an excellent hedge, and is extensively employed for the purpose at Bangalore and elsewhere. In waste tracts, it resuscitates the land and performs the dual function of pioneer and nurse to a more directly profitable class of vegetation. In the latter capacity, it has been found to promote the growth of sandalwood and other useful trees. The species should therefore be looked upon as a reclaimant of waste land, and its growth, except as a well-kept fence, should be strictly confined to such tracts as are now devoid of vegetation. This becomes practicable when we know that it grows in the poorest soils, is exceptionally hardy during periods of drought, and always difficult to eradicate. Functionally, it may be associated with the prickly pear, and such hardy species as are intended by nature to occupy the outposts of vegetation. There are many varieties of the American *Lantana*, the flowers of which vary in colour from pure white to various shades of orange, red, and purple. The latter are very attractive during the rainy months. It has been asserted that snakes are harboured by the species,

but this is open to question, as the stems and branches are thickly armed with recurved prickles.

Cultivation.—Planted in good land, *Lantana* spreads from offsets and seedlings with astonishing rapidity, and becomes a pest in the course of a few years. The shrub should, therefore, be carefully eliminated from all situations where it would monopolise useful land, or retard the progress of other plants of greater utility. Hedges are usually laid down from cuttings of the matured wood, but the seeds germinate, and are no doubt widely scattered by birds and vermin.

450 Tectona grandis, LINN. *Kan.* Tega, Tegu, Tegada mara, Tyagada mara.

Fig.—*Bot. Plates Lal-Bagh Collection. Bedd. Fl. Sylv. t. 250.*

The teak tree. In this province, the most extensive plantations of teak are found in the Heggaddevankote Taluk of the Mysore District. But there are also considerable plantations in the Districts of Shimoga, Hassan, and Kadur, the whole forming a total area of nearly 4,000 acres. The adjoining province of Coorg is also rich in teak. But the South Indian tree appears to attain its greatest perfection on the Anamallay mountains, where, at an elevation of 2,500 feet, Beddome found specimens 22 feet in girth, 90 in length to the first bough, and calculated to be 200 years old. These dimensions are not attained in any part of Mysore or Coorg, but a tree recently felled at Kakenkote, to provide sectional exhibits for the Chicago Exposition, measured 4 feet in diameter, the specimens being perfectly sound. The teak tree clings to the Western Ghâts, and it is only upon or near to certain ranges, at elevations rising from 2,000 to 3,000 feet, where growth is not stunted. The finest specimens attain a height of 150 feet, and present a stately appearance while in leaf and flower. The following statement gives the position and approximate area

of the principal teak plantations within the territories of Mysore.

District.	Taluk.	Name of Plantation.	Approximate area in acres.
Bangalore.	Malvalli ...	Basvanbetta ...	249
	Kankanhalli ...	Chilandadi ...	214
Kolar ...	Chikballapur ...	Nandi	163
Shimoga...	Shimoga ...	Anapinghatta ...	131
	Do	Sakrebail... ...	283
	Sorab ...	Sidihalli	281
Mysore ...	Heggaddevankote	Kakankote ...	121
	Do ...	Mastigudi (old & new)	179
	Do ...	Manchagowdanhalli .	380
	Do ...	Nissen	5
	Do ...	Metikuppe ...	50
	Do ...	Ainur Marigudi ...	50
	Do ...	Begur	154
	Gundlupet ...	Berambadi ...	60
	Do ...	Bandipur	5
	Hunsur ...	Viranhosalli ...	91
Hassan ...	Hassan ...	Bakturvalli ...	300
	Arsikere ...	Hirikalgudda ...	150
	Manjarabad ...	Kemphole ...	20
	Do ...	Bisle	10
	Do ...	Saklespur ...	12
Kadur ..	Tarikere ...	Lakkavalli ...	356
	Yadehalli ...	Hebbe	4
	Chikmagalur ...	Karadihalli ...	262

The important uses, to which teak is applied in ship-building, engineering, carpentry, and cabinet making, are well known, and, added to the high market value of seasoned wood, go far to confirm the popular belief that teak is second to no indigenous timber in works, where strength and durability are the chief factors. It also possesses the great advantage of being comparatively light when seasoned. Weight 42—46 lb. per cubic foot, or in the case of green and unseasoned wood 55—70 lb.

The teak tree loves plenty of light, and although it often hugs a part of the evergreen zone, it rarely mingles with it. The open sides of the hills, or a

Statement showing the market rates for different

District.	Depôt.	Class of Timber. 1st Class. Above 50 c.ft.	Class of Timber. 1st Class. Below 50 c.ft.	Class of Timber. 2nd Class.	Class of Timber. 3rd Class.	Class of Timber. 4th Class.	Class of Timber. 5th Class.	Teak branch pieces. 1st Class.	Teak branch pieces. 2nd Class.	Teak Rafters No. 16, c.ft. 25, or a cart load.	Teak Poles No. 20, c.ft. 25, or a cart load.
Mysore ...	Mysore woodyard...	1 12 0	1 10	1 8 0	1 4 0	1 2 0	1 0 0	1 0 0	0 14 0	22 0 0	24 0 0
	Hunsur	...	...	...	...	...	...	0 12 6	0 10 6	16 0 0	17 0 0
	Maddur	...	...	...	...	...	...	0 12 0	0 11 0	16 0 0	17 0 0
	Antarsante ...	...	...	...	...	...	...	0 14 0	0 12 0	16 0 0	18 0 0
	Hangala	...	...	...	...	...	...	0 12 0	0 11 0	15 0 0	16 0 0
	Chamrajnagar ...	...	...	...	...	...	...	0 12 0	0 11 0	15 0 0	16 0 0
	Begur	...	...	...	...	...	...	0 12 0	0 11 0	15 0 0	16 0 0
	Sargur	...	...	...	...	...	...	0 12 0	0 10 0	15 0 0	16 0 0
	Gundlupet ..	...	...	...	...	...	...	0 13 0	0 11 0	16 0 0	17 0 0
	Hura	...	...	...	...	...	...	0 13 0	0 11 0	16 0 0	17 0 0
	Nanjangud ...	...	...	...	...	...	...	0 15 0	0 13 0	18 0 0	20 0 0
Kadur ...	Lakvalli	1 8 0	...	1 4 0	1 0 0	...	...	...	...	...	...
	Tarikere ...	1 10 0	...	1 6 0	1 2 0	...	...	...	...	...	...
	Chikmaglur ...	1 12 0	...	1 8 0	1 4 0	...	...	...	...	...	...
Shimoga.	Shimoga ...	1 8 0	...	1 4 0	1 0 0	0 12 0	...	...	...	...	...

classes of teak produced in the Mysore forests.

Continued.

District.	Depôt.	Reserved.			Unreserved.			Teak Poles.						
								Contents up to 4 c.ft.		From 4 to 8 c.ft.		From 8 to 12 c.ft.		
		1st Class.	2nd Class.	3rd Class.	1st Class.	2nd Class.	3rd Class.	1st Class.	2nd Class.	1st Class.	2nd Class.	1st Class.	2nd Class.	
Mysore...	Mysore woodyard	...	...	...	...	...	...	...	...	...	...	...	...	...
	Hunsur ...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Maddur ...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Antarsante ...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Hangala... ...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Chamrajnagar ...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Begur ...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Sargur ...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Gundlupet ...	...	...	...	...	...	...	...	...	...	...	...	...	...
	Hura	...	...	...	...	...	...	...	...	...	...	...	...	...
	Nanjangud ...	...	...	...	...	...	...	...	...	...	...	...	...	...
Kadur ...	Lakvalli ...	0 13 0	0 11 0	...	0 8 0	0 7 0	...	...	...	...	...	...	...	0 12 0
	Tarikere ...	0 15 0	0 13 0	...	0 10 0	0 9 0	...	...	...	...	...	...	...	0 14 0
	Chikmaglur ...	1 0 0	0 14 0	...	0 12 0	0 11 0	...	...	...	...	...	...	...	0 15 0
Shimoga..	Shimoga ...	0 13 0	0 10 0	0 8 0	0 8 0	0 6 0	0 4 0	0 8 0	0 6 0	0 10 0	0 8 0	0 12 0	0 10 0	...

451 Tectona Hamiltoniana, Wall.

The Botanical Gardens possess a single specimen of this Burmese tree, which is probably the only one in Mysore. When full grown, it is a small tree of 30—40 feet. Properties unknown at present.

452 Callicarpa lanata, Linn.

Fig.—*Wight Ic. t. 1480.*

Reference.—*Pharm. Ind.*

A woody shrub or rarely a small tree. Indigenous to the hills, and cultivated in the Lal-Bagh for its attractive purple flowers, which are borne in ample cymes at the ends of the branches. The young leaves are densely tomentose, and copper to cinnamon-coloured underneath. As a shrub, the species attains to 15 or 20 feet. It possesses medicinal properties, and affords much mucilage when boiled.

453 Premna tomentosa, Willd. *Kan.* Narave, Iji mara.

Fig.—*Wight Ic. t. 1468. Bedd. Fl. Sylv. t. 251.*

References.—*Brand. For. Fl. 367; Dict. of Econ. Prod. of Ind.; Pharm. Ind.*

Usually a small tree of the deciduous forests in Mysore and Coorg, but under exceptional conditions attaining a height of 40—50 feet. Plentiful at Nundydroog. The fragrant leaves are so much appreciated by the peasants that they use them in lieu of plates to hold their food, the *Iji* leaf being supposed to impart some of its spicy fragrance to the latter. Wood hard, yellow, close-grained, and takes a fine polish; used for making combs. The leaves are given internally and applied externally in cases of dropsy.

Cultivation.—Seeds do not germinate freely, but propagation can be effected from cuttings of ripened wood. Plant at 15—20 feet apart.

454 Gmelina arborea, LINN. *Kan.* Kuli, Coolee, Kasmirimara, Bachanige ?

Fig.—*Bot. Plates Lal-Bagh Collection. Wight Ic. t. 1470; Bedd. Fl. Sylv. t. 253.*

References.—*Brand. For. Fl. 364. Dict. of Econ. Prod. of Ind.; Pharm. Ind.*

A deciduous tree with a roundish or spreading head, attaining in favorable localities to 60 feet. Plentiful in the deciduous belt skirting the hills, and scattered throughout the adjacent dry forests. Several good specimens may be seen in the Lal-Bagh. Leaves opposite, long-petiolate, tomentose when young, but eventually glabrate and shining on the upper surface, glaucous on the under side with prominent nerves; heart-shaped, with 2 glands on the upper base, average blade $7 \times 7\frac{1}{2}$ in. The species flowers in June and November, the panicles being terminal and a foot or more in length; flower yellow inside and brownish yellow outside, fragrant and attractive. Fruit, an ovoid yellow drupe, the size of a loquat, and containing 1—2 seeds. The wood, which is cream to pale yellow, is described as light, close-grained, strong, and workable. It is specially recommended for all sorts of light ornamental work. "The wood of this tree on account of its lightness and toughness is much valued for carriage-building and all ornamental work: it is light yellow with a reddish heartwood, close and even-grained, easily worked, and readily takes paint or varnish. At the Government Medical Store Depôt Workshops, it has been found to be the best wood for making artificial limbs, stethoscopes, &c. It turns well. Weight 30—40 lb. per cubic foot."—*Pharmacographia Indica.*

Graham Anderson has stated that the tree is found in groups in the Manjarabad district, that deer are very fond of the flowers and fruit, and that the body of the large native drum is made of

the seasoned wood. At Kankanhalli and elsewhere, combs are popularly made from it. Although distinctly deciduous in the drier tracts, trees that are well placed in regard to moisture are rarely quite bare of leaf, a circumstance which is easily overlooked from the fact that the flowers and young leaves burst forth together on the approach of the first rains.

Cultivation.—Seeds produced on local trees have not germinated, but as Brandis remarks that the species is easily raised from seed, there must be some error in local treatment. When planted in a deep alluvial soil, at 40 feet apart, the *Gmelina arborea* becomes an excellent roadside tree. It is not however recommended where the soil is poor and stony.

455 **Vitex Negundo,** LINN. *Kan.* Nekkilu, Lakkli, Leckee.

Fig.—*Bot. Plates Lal-Bagh Collection. Wight Ic. t. 519.*

References.—*Dict. of Econ. Prod. of Ind.; Pharm. Ind.; Fl. of Brit. Ind.*

The chaste tree. Seldom attaining to more than a shrub in the drier parts of country, and very abundant in lanes and hedgerows. Leaves and young branchlets hoary underneath, which gives the foliage a pretty effect when moved by the wind. Often used as small fuel, but not for wattle-work, in at least the maidan portion of Mysore. The leaves are commonly used in the peasants' houses as an insecticide, and in fomentation to swellings, headache, and such like. The species is very abundant in Mysore and Coorg, where it mostly affects the dry subalpine region, increasing in stature as it approaches the Ghâts. There are two varieties designated the black—*Kari*—and white—*Bili*—as indicated by the prevailing colour of the foliage. Medicinal virtues are attributed to the leaves, root, and fruit.

"A tree regarded with superstitious fancies by the natives, who use the leaves at certain ceremonies connected with the Dewarlee feast, and at funerals; a bough being generally placed on the mound of a recently-made grave. The leaves are also used as a packing over stored grain to prevent insect attacks."—*Graham Anderson.*

Vitex trifolia, Linn. is known by the same vernacular names, possesses the same properties, and is, in all probability, a mere variety of *Vitex Negundo.*

Cultivation.—As seedlings are difficult to raise, it is usual in this locality—Bangalore—to increase stock from offsets, suckers, and cuttings. If this is done during the rainy season, large numbers of plants may be raised. The species is so hardy that it is found growing in the poorest soils and driest localities. It has a pretty effect on lawns when grown in clumps.

456 Vitex altissima, Linn. *Kan.* Navladi, Nauladi, Nowladi.

Fig.—*Wight Ic. t. 1466; Bedd. Fl. Sylv. t. 252.*

References.—*Brand. For. Fl. 370; Dict. of Econ. Prod. of Ind.*

A deciduous tree attaining a large size in favorable localities on the lower hills, but generally stunted in the maidan districts. Leaves 3—5 foliolate. Flowers in terminal woolly panicles, purple. Fruit the size and colour of a black currant. Beddome, Anderson, and Lovery, all speak well of this wood, although the best supplies are apparently situated in somewhat inaccessible positions. Seasoned wood is brownish-grey in colour, weighs 63 lb. per cubic foot, and is generally used, when procurable, for building and agricultural work. In Manjarabad, it is called 'iron wood.'

457 Vitex alata, HEYNE,

V. pubescens, Vahl. and *V. leucoxylon*, LINN. are Malnad trees of which we require more data. Forest officers should be on the look out for them.

Cultivation.—Propagate from seed, and plant in a situation where there is plenty of moisture, with the necessary drainage. It is not known if these trees coppice, but in all probability they do.

458 Clerodendron inerme, GÆRTN. *Kan.* Vishmadhari gida, Naitakkile.

Fig.—*Bot. Plates Lal-Bagh Collection.*

References.—*Pharm. Ind.*; *Dict. of Econ. Prod. of Ind.*

This common shrub is well known to the people on account of its valuable medicinal properties. The leaves, with their juices, are popularly employed to mitigate fever, for which they possess properties nearly equal to *Chiretta.* When isolated from other large plants, it forms a pretty bush, and is easily trained into an admirable hedge with privet-like foliage and scented flowers. Being compact in growth, easy of propagation, very hardy, and not browsed upon by sheep or cattle, it is, indeed, one of the very best plants for garden fencing. It is said also that cobras have a great antipathy to it. The indigenous shrubs *Clerodendron infortunatum*, Gaert. *C. Siphonanthus*, R. Br. and *C. serratum*, Spreng. are all possessed of medicinal properties.

459 Duranta Ellisia, LINN.

Fig.—*Bot. Plates Lal-Bagh Collection.*

An ornamental shrub cultivated in Indian gardens, but originally introduced from America. There are two varieties, one having pale purple and the other pure white flowers. The species forms an effective hedge, and is easily raised for that purpose from cuttings. Hedges may be seen in the Palace Gardens and at the Lal-Bagh.

460 Citharexylum surrectum, Gr.

Fig.—*Bot. Plates Lal-Bagh Collection.*

Fiddle wood. Introduced from Jamaica and Antigua. A small deciduous tree of rapid growth and conical habit. Young stems quadrangular. Leaves opposite, petiolate,—petiole, coloured orange, 1 in.—ovate elliptic, average blade 6—3 in. Flowers in drooping racemes, white, fragrant, and usually admired. Fruit a small berry. On account of its easy cultivation and deliciously scented flowers, this exotic tree is quite established in Indian gardens. The wood is described by Harrison as follows:—"A most useful timber in building, close grained, and very tough, used for mill rollers and frames, carriage wheels, &c."

Cultivation.—Easily raised from cuttings during the rains. Plant in loose soil at 7 feet apart, subsequently removing every alternate sapling. Secondary leaders are apt to form on the root-stock, and if allowed to grow will eventually supersede the main trunk, and spoil the symmetry of the tree. Seedlings have not been raised at Bangalore.

LVIII. NYCTAGINEÆ.

461 Bougainvillea spectabilis, Comm. B. spectabilis var glabra, Lind. and B. lateritia.

Woody climbers introduced from South America, and cultivated in gardens for their showy bracts. The first named flowers during the early part of the hot season, and is a conspicuous object of beauty when other plants are mostly at rest. The other two species flower at intervals all the year round, on which account alone, the so-called variety *glabra*, is surely entitled to rank as a distinct species. It is also evergreen, while *B. spectabilis* is usually deciduous for a short time. Although small,

it has been observed that the wood of these climbers is tough, durable, and well adapted for providing handles to tools.

462 Pisonia alba, SPAN.

The lettuce tree. So called, as in colour, size, and texture, the leaves somewhat resemble those of the lettuce plant. Cultivation does not succeed at Bangalore, but the tree is a familiar object in Madras and other sea-coast towns. The species is indigenous to the Andaman Islands. Hooker thinks it may be identical with *P. inermis*, Forst. of the Pacific Islands.

LIX. MYRISTICEÆ.

463 Myristica fragrans, HOUTT. *Kan.* (Fruit) Jajikayi, Japatri.

Fig.—*Bentl. & Trim. Med. Pl. iii. t. 218.*

References.—*Pharm. Ind.*; *Fl. of Brit. Ind.*; *Dict. of Econ. Prod. of Ind.*

The nutmeg tree. The maidan portion of the Mysore plateau is too dry for this species, which luxuriates in the moist heat of the Eastern Moluccas. Its cultivation has been attempted more than once in the Botanical Gardens, but not with much encouragement, as the plants are undersized and give no fruit. An attempt is being made by the Inspector General of Forests, to establish the nutmeg tree in the warm sholas of the Malnad, and, knowing that cultivation has been productive at Burliar, on the Nilgiri Ghát, the experiment is not without promise.

464 Myristica laurifolia, HOOK. *Kan.* (Nut) Pindi kayi.

Fig.—*Bedd. Fl. Sylv. t. 267.*

Reference.—*Fl. of Brit. Ind.*

A large evergreen tree of the Malnad, and said to be the commonest of the bastard nutmegs. Leaves

glabrous, shining, very coriaceous, 6—9 in. linear-oblong or variable. Flowers diœcious, small, regular, crowded on the twigs and branches. Fruit the size of an apple. The nutmeg and the mace are said to be of no value, and the quality of the wood is unknown. Herbarium specimens are required, with fuller information as to the local merits of this apparently common tree.

465 Myristica malabarica, Lamk. *Kan.* Kanagi, (Nut) Pinde kayi.

Fig.—*Bedd. Fl. Sylv. t. 269.*

References.—*Pharm. Ind.; Dict. of Econ. Prod. of Ind.; Fl. of Brit. Ind.*

A large evergreen tree of the Western Gháts. In general appearance, it differs but little from the last named species, except in the fruit, which is quite different, and the greater size usually attained. Fruit oblong, 2—3 in., hairy or tanny, "with a lucumose arillus, the lobes of which are twisted and folded into a cone at the top." The mace is deficient in odour and flavour, and is much softer than in the proper nutmeg. It is perhaps best known under the Guzerati name, *Rampatri*, of which a good deal is heard in the Bombay market, where the product commands a value of Rs. 10 per maund of 37½ lbs. A medicinal concrete oil is obtained from the bruised seed by boiling. "Wood reddish-grey, moderately hard. Weight 32 lb. per cubic foot. Used for building." *Dict. of Econ. Prod. of Ind.*

466 Myristica magnifica, Bedd. *Kan.* Ramanadike.

Fig.—*Bedd. Fl. Sylv. t. 268.*

Beddome describes this as "one of the most magnificent trees in the Presidency." It sustains this character in the Malnad of Mysore also, but the Kew authorities, or at least Sir Joseph Hooker, cannot discover that it differs in more than size and pubescence from *M. laurifolia.* Forest officials

would therefore be doing a service to science, if they could settle this question, or at least submit such material as would enable the Kew authorities to settle it.

The vernacular name, *Ramanadike*, or *Rama's* areca-nut, is obviously a misnomer, as, if Rama had any claim to the designation, the latter should clearly be Rama's nutmeg and not his areca-nut. The areca-nut belongs to the natural order Palmaceæ, which comprises an entirely different class of trees. The species under notice attains 100 feet with an immense buttressed trunk. Fruit oblong, nearly 4 in.

467 Myristica Farquhariana, Wall.
Fig.—*Bedd. Fl. Sylv. t. 270.*

This tree is said to be plentiful on the South Canara and Coorg Ghâts. *M. attenuata*, Wall.—Fig. Bedd. Fl. Sylv. t. 271.—should be searched for in the same locality. Nothing is known of the timber afforded by these trees. The genus *Myristica* is confined to steamy woods where the rainfall is heavy and the atmosphere moist. Such being the conditions for healthy development, it cannot be hoped that cultivation would succeed on the arid plains.

LX. LAURINEÆ.

468 Cinnamomum zeylanicum, Bregn. *Kan.* Lavanga-patte mara, Dalchini, Nisane.
Fig.—*Wight Ic. t. 123, 129, 134; Bedd. Fl. Sylv. t. 242; Bentl. of Trim. Med. Pl. t. 224.*
References.—*Dict. of Econ. Prod. of Ind.; Pharm. Ind.*

A small evergreen tree, young leaves and shoots having beautiful reddish and carmine tints. Indigenous to Ceylon, Burmah, and the Deccan Peninsula. Cultivated in the Lal-Bagh. The liber or inner bark affords the Cingalese cinnamon of commerce, and the aromatic leaves are extensively used in

condiments and medicine. The essential oil of cinnamon is obtained from the liber, but other oils are afforded by the leaves and root.

The cinnamon trees found in the Malnad are of a larger size and coarser texture than the typical form of *C. zeylanicum*, and it is doubtful if they are mere varieties of the latter, or if they should be referred to one or other of the following species. Aromatic trees of this class, especially the Ceylon cinnamon, possess antiseptic properties in a rare degree, and should be thickly planted about pestilential towns and villages to improve the health of the public. It has been stated on good authority that the essence of cinnamon kills the microbe of typhoid fever in 12 minutes, while corrosive sublimate, the most powerful antiseptic known, requires 10 minutes to perform the same work.

Cultivation.—All the species of *Cinnamomum* referred to in this list require about the same treatment. They luxuriate in moist valleys, where the temperature ranges from 70° to 85° or even 90.° Seedlings planted in virgin forest soil or deep loam, at 15 feet apart, soon become strong bushes.

469 Cinnamomum iners, Reinw. *Vern.* Adavi-lavanga-patta, Dalchini, Yellaga mara, Cuddu-lavanga.

Fig.—*Wight Ic. t. 122, 135.*

References.—*Fl. of Brit. Ind.; Drury U. Pl.; Gamb. Man. Timb.*

A small tree of the western Malnad. Slightly larger in leaf, and not so compact in growth as the last named species. Bark aromatic and used as *Taj* or Indian cinnamon. Not very common in Shimoga, although Lovery remarks that it is locally used for building and fuel.

470 Cinnamomum macrocarpum, Hook.

Fig.—*Wight Ic. 130.*

Probably known by the same vernacular names. A small tree with somewhat slender leaves and

branches. Fruit larger than in any of the other species. We are much in want of herbarium specimens representing all the indigenous *Laurineæ*.

471 Cinnamomum nitidum, BLUME.

This species resembles number 469, except that the flowers are about twice the size. It is entered as an indigenous plant with some hesitation. *Fig. Wight. Ic. t. 137.*

472 Machilus macrantha, NEES. *Kan.* Chittu tandri mara.

Fig.—*Wight Ic. t. 1824; Bedd. Fl. Sylv. t. 264.*

A large evergreen tree of the Malnad. Properties unknown. Watt observes that "it is known as *Gumara* in the Konkan forests."

473 Alseodaphne semecarpifolia, NEES.

Fig.—*Wight Ic. t. 1826, 1827. Bedd; Fl. Sylv. t. 297.*

This is a large or small tree of variable character. The "Flora of British India" enumerates no less than 5 varieties of the species. It is reported to be a good timber tree, and is in demand for boat-building in Ceylon, where it is said to resist the attacks of the dreaded teredo.

474 Litsæa Wightiana, WALL. *Kan.* Hammaddi? Halmaddi?

Fig.—*Bedd. Fl. Sylv. t. 293.*

A tolerably large tree in the Hassan, Kadur, and Shimoga Districts, where it grows rather extensively. The wood is reported to be soft and light, being used to some extent for making wooden vessels and for fuel. It, however, yields a resin, which is locally used in lieu of frankincense. The tree is evergreen. Although several species of *Litsæa* are known to be indigenous to the Western Ghâts, their names and properties are not reported by the local officials.

475 Persea gratissima, GÆRTN.

The Alligator or Avocado pear. A small evergreen tree introduced from the West Indies and tropical America, where it is highly prized for its fruit. Rarely seen except in Botanical Gardens. The fruit does not appear to be appreciated in this country, nor is its preparation for the table understood.

476 Hernandia bivalvis, BENTH.

Specimen in the Lal-Bagh. An evergreen tree of E. Australia.

477 Hernandia sonora, LINN.

An American species cultivated in the Lal-Bagh.

LXI. PROTEACEÆ.

478 Helicia robusta, WALL. *Kan.* Tegala mugu.

Fig.—*Wight Ic. t. 191.*

Reference.—*Fl. of Brit. Ind.*

A handsome tree said to be found in Hassan. It may be mistaken for *H. travancorica*, Bedd., which the latter authority has figured in "Flora Sylvatica" under the above name. Found growing on the banks of streams. Uses unknown.

479 Macadamia ternifolia, F. MUELL.

The Queensland nut tree. Cultivated in the Botanical Gardens where, however, it has not yet attained maturity.

"A small-sized tree, with a very dense foliage. Found in dense, moist scrubs on the banks of rivers; wood firm, fine-grained, and takes a good polish. This tree bears an edible nut of excellent flavour, which is relished by the white colonists as well as by the aborigines. It forms a nutritious article of food to the latter, and, in consequence, the restriction with regard to this tree as in the case of

Araucaria Bidwillii (Bunya Bunya), is made in the licenses issued for cutting timber." *Walter Hill.*

480 Grevillea robusta, Cunn.

The silky or silver oak of Australia. This graceful tree has spread very rapidly in the coffee plantations of Southern India within the past decade. In Manjarabad, Coorg, Shevaroy Hills, and the Wynaad, it is somewhat extensively planted as a break-wind, and to shade coffee. The Lal-Bagh has issued large quantities of seed to the above districts, but the demand is usually greater than the local supply can meet, although high prices are now charged for the seed. In the moister and cooler region of the hills, the so-called silver oak, for it must be remembered that it is not a member of the oak family, attains a large size, is very ornamental, and yields a fine timber. But at Bangalore, Mysore, and generally throughout the maidan, growth is less satisfactory, the tree being stunted in size, resiniferous, and in very dry localities short-lived. When young especially, the tree is very graceful in its upright or conical form, silvery foliage, and orange-red flowers in dense, bottle-brush racemes. It flowers in the cold weather, and seeds freely during the months of June and July. The silver oak is admirably adapted for scenic grouping, affording as it does, a distinct contrast in form and colour to the indigenous trees of this country. The branches and young wood are very brittle, but as the trunk matures it becomes tough, durable, and beautifully marked.

"Diameter 30 to 40 inches; height 80 to 100 feet. A lofty tree of frequent occurrence in the scrubs along the coast, and for a considerable distance in the interior. The wood is extensively used for staves for tallow casks, and is in much repute for cabinet work. At present the sawyers are receiving at the rate of 8 *s.* to 9 *s.* per hundred feet." *Walter Hill.*

Cultivation.—Seeds collected at Bangalore germinate at the rate of 20—30 per cent. Once rooted, the seedlings are very hardy and transplant with few casualties. It will be seen from Mr. Hill's remarks that the tree clings to the seaside, a fact which will account for its fine growth on those estates lying nearest to the sea on the hills of Southern India. For the growth of timber, the *Grevillea robusta* should be planted at 7 feet apart, the final trees being left at 14 feet. It is a good lawn tree, as grass grows well under it.

LXII. ELÆAGNACEÆ.

481 **Elæagnus latifolia,** LINN. *Kan.* Hejjala.

Fig.—*Wight Ic. t. 1856*; *Bedd. Fl. Sylv. t. 180.*

Reference.—*Dict. of Econ. Prod. of Ind.*

The bastard oleaster. A large scandent bush, climber or small tree according to position and surroundings. Leaves silvery on the underside. The fruit, which is acid and astringent, is said to be eaten by the tenders of cattle on the Nilgiri range of the Western Ghâts. It is also eaten by the peasants of Mysore, where the bush is found in quantity. The species can be propagated from seed, and it forms an effective bush to screen off unsightly walls or buildings.

LXIII. LORANTHACEÆ.

482 **Loranthus longiflorus,** DESROUSS. *Kan.* Badanike.

Fig.—*Wight Ic. t. 302.*

References.—*Brand. For. Fl. 397*; *Gamb. Man. Timb. 320*; *Dict. of Econ. Prod. of Ind.*; *Fl. of Brit. Ind.*

An evergreen parasite found on mango and other trees, from which it is suspended at intervals in

ample twiggy bunches of a pale green colour. The long tubular flowers, composed of yellow green and reddish colours blended together, are attractive. But the species is aggressive, very hurtful to trees, and should be diligently removed from all useful species, whether grown for timber, fruit, or other products. The local trees that are mostly infested are the mango, banyan, *Strychnos nux-vomica*, *Albizzia amara*, and *Anogeissus latifolia*. Of the 58 species of *Loranthus* described in the "Flora of British India," about 18—20 are indigenous to Mysore, the greater part being confined to the hills. The vigorous growing kinds are usually destructive to trees, and shouldbe treated as a pest by the forester. In the maidan country at least, all the species are known by the vernacular name *Badanike*. Some of them are not unlike the 'miseltoe,' to which the genus is closely allied. There are also one or two species of *Viscum* in the provinces of Mysore and Coorg, although not the one that affords the real 'miseltoe bough' of ancient and modern renown.

LXIV. SANTALACEÆ.

483 **Santalum album**, LINN. *Kan.* Gandha, Srigandha.

Fig.—*Bot. Plates Lal-Bagh Collection. Bedd. Fl. Sylv. t. 256; Bentl. and Trim. Med. Pl. t. 292.*

References.—*Fl. of Brit. Ind.; Pharm. Ind.; Dict. of Econ. Prod. of Ind.*

The sandalwood tree. This important species attains its maximum utility, and is most abundant in the Mysore country, where also it is a Government monopoly, and commercially the most valuable timber tree in the State forests. Its range of growth lies mostly to the west and south of the province, following an almost unbroken line through the deciduous and mixed zone of the Shimoga, Kadur,

Hassan, Mysore, and Bangalore Districts. On the other hand, the extreme maidan Districts of Kolar, Tumkur and Chitaldroog, produce comparatively little sandal. In point of growth, outturn, and revenue, the best results have been attained at Shimoga in the north-west, and Mysore in the south. The altitudinal range of the species is roughly 2,000—4,000 feet, although on the Nundydroog hill, in the Kolar District, it is flourishing at an elevation of 4,500 feet.

A small, evergreen tree of 25—35 feet, occasionally larger in rich soil, but usually smaller as the latter deteriorates and becomes deficient of moisture; insignificant in general appearance. Diameter at base 1′ to $1\frac{1}{4}$′. Bark $\frac{1}{4}$ in., brownish-grey on the surface, reddish within; often ruptured vertically. Leaves opposite, petiolate, exstipulate, entire, ovate, ovate-lanceolate, elliptic-ovate, glabrous and shining on the upper surface, young leaves dark green and more or less glaucous underneath, older ones pale or yellowish green and variable in size; average blade $2\frac{2}{3} \times 1\frac{1}{8}$ in. Flowers in terminal and axillary, trichotomous cymes, shorter than the leaf. Flower inconspicuous, in parts of 4 or very rarely 5; perianth changing from pale-green and brown to crimson; stamens 4, attached to the tube of the perianth and associated with interposed hairy processes; pistil bottle-shaped with a 3-lobed stigma. Drupe globose or subglobose, glabrous and shining, annulate near the apex, one-seeded; the colour and size of a large black currant or small gean.

Although strictly preserved by Government, the sandalwood tree suffers from the attacks of men and animals to a very large extent. It is only after the seedling, or offset, attains a certain height that its removal becomes punishable, and to prevent trouble of this sort, the raiyat is careful to remove

seedlings while they are very small. This is natural, as the raiyat derives no benefit from the growth of sandalwood, while by its removal he protects his fields from the encroachment of unproductive growth, and evades the responsibility which would fall upon him should trees exist in his holding. This is the most serious form of destruction the authorities have to deal with, and the best remedy would be to offer the raiyat a share in the profits arising from sandal cultivation. If the remuneration was sufficient, he would then nourish the tree in every nook and corner not required for the production of food and raiment. But it is equally if not more important that the cultivation of sandal should be pushed in semi-barren tracts, where the raiyat has but little control, and where the cultivation of field crops would be out of the question. This is all the more desirable when it is known that the finest quality of sandalwood is produced on poor rocky soils. Associated in such places with *Lantana*—the latter as a nurse—there is a wide field in Mysore for the artificial propagation and extension of this valuable tree. Seeing the advantage of such production, the local Forest Department has already adopted measures both for the improvement of natural growth, and the planting of entirely new areas.

The bark and alburnum—sapwood—of the sandal tree are comparatively useless products, and the value of the duramen or heartwood depends almost wholly on the presence of a fragrant essential oil of high specific gravity. Protracted growth appears to favour the development of oil in the cells, so that very aged trees, whether of medium or small growth, are usually the most fragrant and oleiferous. It is for this reason that some persons deprecate the felling of sandal until it has altogether ceased to vegetate. But with this species, the span of life is

very uncertain, and while exceptional specimens may attain to nearly a hundred years, a large percentage die young, and are of little value for the market. It would seem, therefore, that matured trees of 30 years of age and upwards might be felled with advantage even if they are not dead. With regard to the colour and marking of sandalwood, there are at least four varieties, *viz.*, the *Kempu*, red; *Bili*, white; *Navilu*, peacock; and *Naga*, cobra. The two first named are distinguished by colour alone, while the two latter possess peculiar marks indicating, in their arrangement, some resemblance to the peacock and the cobra, on which account they are held in the highest esteem, and always command fancy prices.

"Sanskrit writers make two kinds of chandana: the darker, heartwood, they call *Pita-chandana*, or yellow sandal; and the lighter wood *Srigandha*, or white sandal—It is more likely that these names refer to the two distinct varieties referred to above, and not to any definition of the wood in a single tree—Chandana is mentioned in the *Nirukta*, or writings of Yaska, the oldest Vedic commentary extant, said to be written not later than the 5th century B. C. It is also referred to in the ancient epic poems of the Hindus, the *Ramayana* and *Mahabharata*. According to the *Kathasaritsagara*, it is one of the trees of the Buddhic paradise, and the chariot of the sun is made of its wood bound with gold." *Pharmacographia Indica.* But red sandalwood is by far the most abundant and may be described as a pale reddish wood interspersed with concentric zones of yellow and darkish-brown; it is exceedingly dense, moderately hard; and easily worked with delicate tools; it is not attacked by white ants, and the contained oil preserves it wonderfully, whether above or below the ground. Weight 56—60 lb. per cubic foot. As an aromatic

and fancy wood it is unrivalled, and no other wood commands such a high price in the open market. The annexed table gives the outturn of sandal in Mysore with the revenue derived therefrom during the past five years. When matured or dead, the sandal trees are collected departmently, and conveyed to a number of conveniently placed Depôts or *Kotis*, where they are finally dressed, sized, classified, weighed and stored, in readiness for the annual auction sales which usually take place during the two last months of the calendar year, and are so arranged that buyers can travel comfortably, and without much loss of time, from one Depôt to the other, beginning at Sagar in the north-west of the province and ending at Hunsur in the south. There are at present eight *Kotis*, of which Shimoga possesses three, Mysore two, and the other districts one each. Further details will be found in the annexed map showing the approximate distribution of *Santalum album* within the territories of Mysore.

The sandal thus disposed of, amounting to about 2,000 tons annually, finds its way mostly to Bombay, and thence in varying quantities to China, France, Germany, and a few other countries. A large quantity is retained in India for purposes of cremation, for consumption in the fire temples of the Parsis, for the extraction of oil, and for domestic and temple functions. A much smaller quantity enters into the local industries of carving and distilling. The dead or fully matured root of the tree contains the largest percentage of oil, and is preferably used for the extraction of that valuable product.

"By the Indian process only 2·5 per cent of oil is obtained from the wood," while the article is badly coloured and always very impure; "but the powerful apparatus of Messrs, Schimmel & Co. of Leipzig affords as much as 5 per cent." Pure sandal

Map showing the approximate distribution of Sandalwood in Mysore.

Scale 50 Miles to an Inch.

Statement showing the collection, disposal of, and revenue from sandalwood during the past 5 official years.

Years.	Mysore.			Shimoga.			Bangalore.			Hassan.			Kadur.			Yearly total of—		
	Collection.	Disposal.	Revenue.	Collection.	Disposal.	Revenue.	Collection.	Disposal.	Revenue.	Collection.	Disposal.	Revenue.	Collection.	Disposal.	Revenue.	Collection.	Disposal.	Revenue.
1888-89	937½	428	1,16,548	814	785⅘	2,33,498	160¼	185⅞	72,210	255⅞	238½	98,046	129⅜	194¼	73,235	2,297	1,832½	5,93,537
1889-90...	405¼	990¼	3,83,320	764¼	739	2,31,737	176½	158¾	67,109	239½	258¼	1,15,058	221¼	203	72,518	1,807	2,349	8,69,742
1890-91...	1,179¾	1,077¼	3,92,077	869¾	863¼	2,68,937	172½	162	68,619	441¼	291	1,27,197	228¼	202¼	77,401	2,891½	2,595¾	9,34,231
1891-92...	962¼	934¼	3,97,463	968¼	810½	2,81,076	233¾	173½	86,554	300¼	318	1,44,975	203½	203¼	71,465	2,668¼	2,439½	9,81,533
1892-93...	857	728½	3,05,524	982¾	642¼	3,08,058	153½	182¾	83,204	233¼	250	1,17,404	222½	179½	80,051	2,449	1,983	8,94,241

oil, such as has recently been distilled by Mr. Petrie Hay of Hunsur, is worth two rupees an ounce. It is a product for which there is a growing demand in arts, medicine, and perfumery. Sandalwood carving is pre-eminently a local hand industry of great antiquity, handed down from father to son for many generations ; but it is practically confined to one or two small towns, and perhaps a few hamlets in Shimoga, the north-west corner of the province, Sagar and Sorab being the principal seats of manufacture. These carvings vary in price from one to a thousand rupees, and consist of a great variety of articles, the more prominent being small cabinets, temples, *swami* figures, boxes, albums, fans, switches, walking sticks, card cases, paper cutters, chess-boards, and toys. Reduced to a fine paste, the wood is popularly used by the Brahmins for marking the forehead and body.

Cultivation.—The *Gandha mara* is generally looked upon as a somewhat delicate tree, although, judging from its tenacity of growth in poor soils while exposed to occasional long periods of drought, it often belies this character. But these are the only conditions under which the species is really hardy, and in situations, where the drainage of the soil is defective, it is usually very delicate. Planting should therefore be avoided in wet land. A rather heavy rainfall will not hurt the tree, providing that the soil is porous enough to carry off surplus water before stagnation sets in. The roots and bark are sensitive of injury, and the tree is easily killed by fire. It is reproductive from seed, but rarely grows thickly, single specimens attaining maturity at intervals of ten to a hundred yards. If seedlings are crowded, they seldom attain a good size, so that judicious thinning in the early stages of growth becomes an important factor in the cultivation of sandal. Suckers are occasionally given off from old trees, but

they do not appear to come to anything. Crows are very fond of the ripe fruit, and are supposed to deposit the seeds favourably in hedgerows and bushes, where the seedlings procure the necessary shade and protection required by them during the first two or three years of development. In artificial treatment, the introduced shrub, *Lantana camara*, Linn. has proved to be a good nurse for sandal seedlings. This is a great discovery which should not be lost sight of whenever the question of reclaiming *karab*, or waste land, presents itself. A peculiarity of sandalwood is that it will not grow within walled enclosures, nor is it found on the sites of deserted villages. Mr. D. E. Hutchins, a former officer of the Mysore Forest Department, has written as follows:—"When young, sandal has to contend with many enemies. The smooth succulent character of the leaves of sandal doubtless contributes to render them the favourite food of hares and deer. (Cattle and goats are also very partial to the leaves). When planting sandal, it is usually necessary to place thorns over each plant to keep off hares. If spotted deer are abundant in the locality, it becomes necessary to fence plots of sandal planting. Self-sown seedlings of sandal are rarely seen except among clumps of thorns and other bushes where they are naturally protected from browsing. The sandal tree attains its commercial maturity, *i.e.*, the age at which it pays best to cut it down, at 27 to 30 years. At this period, the heartwood is well developed (*i.e.*, at a general depth of about 2 inches below the surface) and the growth of this is so slow that it cannot in a year attain an increased value equal to the interest on its present selling price, *plus* the value of the space it would occupy.

It is therefore found most profitable to cut it down between the age of 27 to 30 years."

With regard to the above remarks, it may be observed that the heartwood increases with the age of the tree until there is practically no sapwood left, and the correct time to fell would appear to be at this juncture. In propagation, the best results are obtained by sowing the ripe berries newly taken from the tree, with the seed in them. If the fruit is dried in the sun or kept for a few weeks, it does not answer so well. The red soil about Bangalore—loam incorporated with oxide of iron—appears to suit the requirements of sandal, especially when it forms ridges, or is situated between low rocks on the higher grounds.

484 **Scleropyrum Wallichianum,** ARN. *Kan.* Benduga.
Fig.—*Bedd. Fl. Sylv. t. 304.*

A small tree in Hassan, Coorg, and the Wynaad. Often spiny. Flowers in short catkins near the ends of the shoots. Uses unknown.

LXV. EUPHORBIACEÆ.

485 **Euphorbia Tirucalli,** LINN. *Kan.* Kalli, Bonta kalli; Kadu-nevali.
Fig.—*Bot. Plates Lal-Bagh Collection.*
Reference.—*Dict. of Econ. Prod. of Ind.*

A small tree of hedgerows. Erect, 12—20 feet, leafless or with inconspicuous leaves. Whole plant green, glabrous, much branched, branches resembling stout rushes, but easily broken and very milky. Commonly known as the 'milk hedge' or 'milk bush.' Indigenous to Africa, but extensively naturalised in this country. The acrid juice is a well known purgative and counter-irritant. The old wood affords material for making gunpowder charcoal; and the very acrid nature of the milky juice prevents cattle from breaking the plant, on which account it affords an excellent fence for

pasturage. *Kalli* is well known throughout the province.

486 Euphorbia neriifolia, LINN. *Kan.* Yale kalli.
E. antiquorum, LINN. *Kan.* Bontakalli.

Succulent shrubs often used for fencing, and well known in the maidan for their medicinal properties. The last named species and *E. trigona*, Haworth, make good railway fences. All the species grow from cuttings readily.

487 Buxus sempervirens, LINN.

The box tree is cultivated in the Botanical Gardens, where, however, it never attains anything like its normal size.

488 Bridelia retusa, SPRENG. *Kan.* Gurige, Gworgie, Goje, Asana ?

Fig.—*Bedd Fl. Sylv. t. 240.*

References.—*Fl. of Brit. Ind.*; *Gamb. Man. Timb. 356.*

A middle sized or large, deciduous tree. Herbaceous parts usually thorny; young leaves tomentose on the underside, matured leaves coriaceous, rigid and prominently nerved. Flowers small, yellow, in short lateral spikelets. Fruit black-purple the size of a pea. Sir Joseph Hooker names four varieties of the species. Generally found in the deciduous and mixed zones and on the outskirts of the evergreen belt. Although comparatively small, the heartwood is close grained, nicely mottled, and said to take a good polish; it is also hard and durable, but not very easily worked. Weight 56—64 lb. per cubic foot.

"The astringent properties of the bark of this tree appear to be well known throughout India, and it is in general use for tanning leather. The wood is also much used on account of its durability under water, for making well-curbs. In Western

India, the bark has a reputation as a lithontriptic, and is in general use as an astringent. When wounded, the bark exudes a blood-red juice, which stains the hands, and is very astringent." *Pharmacographia Indica.*

It is also stated in the above work that the bark contains 39·9 parts of tannic acid. Such being the case, it must be an exceptionally powerful astringent. The leaves are valued as food for cattle; while the berries are much eaten by birds, and occasionally by children, to whose mouths they impart a deep claret colour.

"A tree generally found in the outskirts but sometimes in the forest. It has small oval leaves. (they should be retuse) The bark is about ½ inch thick, rough and very dark-grey, nearly black in colour. The inner bark is of a deep blood colour and fibrous in texture; affords splendid wood for bed-plates, posts or beams, being very hard, heavy and durable."—*Graham Anderson.*

The species *B. montana*, Willd. a low tree, and *B. stipularis*, Blume. a scandent shrub, are also found in the Malnad. Botanical specimens of the whole genus would be acceptable at head quarters.

489 Phyllanthus Emblica, LINN. *Kan.* Nelli. Fruit—Nelli kayi.

Fig.—*Bot. Plates. Lal-Bagh Collection. Bedd. Fl. Sylv. t. 258. Wight Ic. t. 1896.*

References.—*Pharm. Ind.; Dict. of Econ. Prod. of Ind.; Gamb. Man. Timb. 351.*

The emblic myrobalan tree. Bare of leaf during the greater part of January and February, or longer in arid situations. In garden land, it is rather a striking tree of 35—40 feet. Leaves very small, distichously and closely set like the leaflets of a finely pinnate leaf. In general effect, the foliage is not unlike the tamarind tree, but much paler in colour. Although wild all over the country, it is

only in cultivation, and in the most favourable positions where fine specimens are seen. Flowers small but very numerous and densely fascicled on the matured wood, whitish, changing to pale yellow, appearing in May. Fruit depressed-globose, clear, fleshy, faintly 6-lobed and 6-seeded, varying in size from a large gooseberry to a crab-apple, ripening in November. Being highly esteemed for its acid fruit, the tree is commonly found in gardens, where it is often spoken of by English people as the 'Indian gooseberry tree.' Wood mottled brown, red and yellow, centre darker but showing little definition of heartwood. Weight 43—50 lb. per cubic foot.

Remarkable for its durability under water, which it also clears of all impurities. To effect the latter object, it is a common practice to throw chips of wood into a well or drinking pond. The bark is a good tanning material, and medicinal properties are attributed to it, as also to the flowers and fruit. The latter is held in great esteem by all classes, who consider it to be refrigerant, diuretic, and laxative. It is also pickled largely, and commands a market value of about Rs. 32 per candy of 7 cwts. It is an excellent thing to quench thirst and is said to improve the taste of water. The peasants like to suck the fruit while on fatigue duty, as when ascending a steep hill.

Cultivation.—Although very hardy in dry situations among rocks, the *Nelli* requires a good deal of moisture and proper cultivation to enable it to yield superior fruit. The seeds are very hard and take nearly a year to germinate in the ordinary course, but by steeping for 24 hours in camphorated water germination will be effected within a few weeks. It is doubtful, however, if the sowing would be very productive of seedlings, as a large percentage of the seed is usually barren. When the seedlings are nearly two feet high, plant in large

pits at 30 feet apart. In artificial treatment, irrigation will be required during the first dry season. In rock-lands, the *Nelli* is often reduced to a large bush.

490 **Phyllanthus distichus,** MUELL. ***Kan.*** Kirunelli mara.

Fig.—*Bot. Plates. Lal-Bagh Collection.*

References.—*Fl. of Brit. Ind.; Dict. of Econ. Prod. of Ind.*

The star gooseberry tree. Indigenous to Madagascar and the Malay Islands, naturalised in Indian gardens, where the species is popularly cultivated both for ornament and fruit. A small round-headed tree of 20—30 feet. Leafy branchlets nearly two feet in length and resembling long pinnate leaves. Deciduous at the close of the hot season. The small flowers appear in advance of the leaves in June, and are densely crowded on the naked limbs and branches, where the fruit subsequently appears in ample clusters. The latter is much relished both in dessert and pickle.

Cultivation.—Seeds germinate somewhat reluctantly, but steeping for a few hours in tepid or camphorated water helps the process. Square pits 4'×4' wide and 3' deep should be opened six months in advance of the planting season, on the arrival of which healthy seedlings should be planted at 15—20 feet apart. A proportion of decomposed cattle manure, equal to $\frac{1}{3}$ of the soil around the pit, should be applied and thoroughly mixed in the latter when refilled. Growth is rather slow at first, but under careful treatment the tree will begin to fruit in the fifth year.

491 **Phyllanthus indicus,** MUELL.

A deciduous tree of 30—40 feet. Entered with hesitation as the species is not verified in Mysore. Branches terete, white spotted. Leaves 5×2 in. distichous, membranous and variable in shape.

Fruit somewhat like that of *Nelli*, but much smaller. Should be searched for on the outskirts of the Malnad proper.

492 **Cleistanthus collinus**, BENTH. *Kan.* Kodasigina, Bodadaraga.

Fig.—*Bedd. For. Man. 203, t. 23, f. 5.*

Reference.—*Pharm. Ind.*

A small, deciduous tree of low hills. Wood very hard. The leaf, root, and fruit, of the plant are poisonous. Rare in Mysore, but should be reported on when found in any quantity. The nut is a deadly poison.

493 **Glochidion neilgherrense**, WIGHT. *Kan.* Banavara.
494 **Glochidion zeylanicum**, A. JUSS.

Small evergreen trees of the Malnad. When dried, the leaves become quite black. Other species which may possibly be growing in the evergreen forests are *G. Hohenackeri*, Bedd. *G. Ralphii*, Hook. *G. Johnstonei*, Hook. *G. arboreum*, Wight and *G. malabaricum*, Bedd. The economic properties of these trees and shrubs are practically unknown, neither is it certain that they all exist in the State Forests. *Glochidion* is a large Indian genus.

495 **Flueggia microcarpa**, BLUME. *Kan.* Bili suli.

Fig.—*Bot. Plates Lal-Bagh Collection. Wight Ic. t. 1994.*

Reference.—*Dict. of Econ. Prod. of Ind.*

A spinescent shrub having long flexuous branches, deciduous leaves, minute flowers, and small white berries. Planted against a tree, it becomes scandent. Found in hedgerows and in the scrub tracts, but not very abundant. The supple branches are plaited around the eaves of thatched roofs to supply a basis, and form a good support to the thatch.

The leaves are possessed of medicinal properties, and the bark is said to be a fish poison.

496 Flueggia Leucopyrus, WILLD.

Fig.—*Wight. Ic. t. 1875.*

Similar to the above, except that most of the salient organs are smaller. The authors of *Pharmacographia Indica* assert that the sweet, white berries are eaten by children, who call them *Madh* -honey-and that the juice of the leaves is used to destroy worms in sores. Like the foregoing, the bark is said to be a fish poison. When planted and trimmed for the purpose, these plants make fairly good hedges.

497 Breynia rhamnoides, MUELL. *Kan.* Kari suli.

Fig.—*Bot. Plates. Lal-Bagh Collection. Wight. Ic. t. 1898.*

Reference.—*Dict. of Econ. Prod. of Ind.*

Usually found in the scrub tracts, where it is very common as a low bush, and occasionally attaining the size of a small tree, 12—15 ft. Berry globose, but flattened at both ends, the size of a small pea, red changing to black. Branches used in thatching like number 495. "The dried leaves are smoked like tobacco in cases in which the uvula and tonsils are swelled. The bark is astringent." *Pharmacographia Indica.* This bush can also be utilised for hedging. *Anna suli*, a small shrub of rocky ground, is probably a species of *Phyllanthus.* Although usually very small, it is reputed for the hardness and tenacity of its wood. Fruit black, when ripe.

498 Putranjiva Roxburghii, WALL. *Sanskrit* or *Kan.* Putra-jiva, Putrem-jiva.

Fig.—*Bedd. Fl. Sylv. t. 275. Wight. Ic. t. 1876.*

References.—*Brand. For. Fl. 451. Gamb. Man. Timb. 353.*

A small evergreen tree with small diœcious flowers and drupal fruit the size of a jamoon. Strung into

necklaces, the latter are worn as a charm by the village children, where the tree is found plentifully, The translation of the vernacular name being, "that which makes the child live." Trees cultivated in the Lal-Bagh for a quarter of a century are only 20 feet in height. The wood appears to be hard and durable, although meagre in size considering the long period of growth. *Polyalthia longifolia*, a lofty tree of the *Anonaceæ*, is occasionally spoken of by the name of *Putrajiva*, care is necessary, therefore, not to confound the one species for the other. In some Indian works, the fruit is referred to as a nut, but it is a proper drupe.

499 **Hemicyclia venusta**, THWAITES.
Fig.—*Wight Ic. t. 1922.*

500 **Hemicyclia elata**, BEDD.
Fig.—*Bedd. Fl. Sylv. t. 279.*

Evergreen trees of the Western Malnad. **Botanical** specimens should be collected, as nothing definite is locally known about these trees. Beddome describes the last named as a tree of 90—100 feet.

501 **Bischofia Javanica**, BLUME. *Kan.* Gobra nairul, Govarnellu?

Fig.—*Bedd. Fl. Sylv. t. 259. Wight Ic. t. 1880.*
References.—*Dict. of Econ. Prod. of Ind.; Brand. For. Fl.*

A glabrous round-headed tree of 30—40 feet. Deciduous for a few days or subdeciduous, according to season. Not uncommon in the forests of Kadur, Hassan, and Shimoga. Leaves alternate, 3-foliolate. Flowers minute, green, in slender panicles. Fruit the size of a large pea, blue-black. The Sub-Himalayan form is described as follows:—

"The leaves are renewed in February and March. Fl. March, April. The fruit ripens in April of the ensuing year. An exceedingly handsome tree attaining 70 feet, and 7 ft. girth, with a shady oval crown.

In dry places a stunted tree 15—20 feet high. The foliage is deep green, and turns red before falling."
Brandis.

The same authority writes that the fine close-grained wood seasons well, is durable, and used for furniture. Planters sometimes call it red cedar. "In rich land, this tree is generally left and agrees well with coffee. The foliage is somewhat dense however and in moist situations the coffee grows very slowly under it. Wood is red, easily cut with the axe, and is very apt to split after being squared. It is used for rough purposes and for making pounding-poles." *Graham Anderson.*

The vernacular name indicates that some product of the tree affords manure, this is possibly the leaf, which is said to be abundant and changeable in colour. Botanical specimens and seeds would be acceptable at head quarters.

502 Antidesma Ghæsembilla, GÆRTN. *Kan.* Pullam-purasi gida.

Fig.—*Wight Ic. t. 820, 821.*

References.—*Fl. of Brit. Ind.*; *Dict. of Econ. Prod. of Ind.*

Confined to the deciduous tracts of Mysore, where it rarely attains to more than a large shrub. Found at Kankanhalli and elsewhere at intervals, but not very common. Leaves alternate, entire, stipulate, roundish to obovate or variable; average blade 3 × 2 in., young herbaceous parts rusty-tomentose. Flowers diœcious, minute, in terminal branched spikes. Fruit subglobose, the size of a black currant; eaten by children and possesses an agreeable subacid flavour, produced in ample reddish clusters near the ends of the shoots. Wood small, but hard, reddish, close-grained and durable; weight 49 lb. per cubic foot. The scarcity of this species is probably due to the want of fertility in the seed.

503 Antidesma Bunius, SPRENG.

Fig.—*Wight Ic. t. 819.*

References.—*Fl. of Brit. Ind.; Dict. of Econ. Prod. of Ind.*

A small evergreen tree of the Western Ghâts, where it is partial to the moist localities. Cultivated in the Botanical Gardens, and in the nursery of MESSRS. MUNISAMI & Co. at Bangalore. Leaves alternate, ovate-lanceolate to elliptic, glabrous and shining. Pistillate flowers in simple spikes; male flowers not seen in local trees, although fruit is plentifully produced upon them. Fruit the size of a large currant, greenish-yellow, changing to red in the ripening stage, and when changing colour very like a miniature apple, produced in clusters or small bunches. Not unpleasant when ripe, but improved in a tart, and possibly as a preserve. The undetermined species of *Antidesma* likely to be found in the forests of the Malnad are *A. Alexiteria*, Linn. *A. diandrum*, Roth. and *A. Menasu*, Miquel. Specimens should be collected for herbaria with the object of identifying the above, and perhaps one or two additional species, the names of which are withheld for the present.

Cultivation.—As seeds are not produced by the local trees, the latter are wholly increased from layers. No doubt seeds are plentiful in the forests when both sexes are represented. It is also probable that several varieties exist in addition to the species suggested in this paragraph.

Plant in a position where the land is deep and comparatively moist all the year round, as under the bund of a tank or the bank of a channel. Distance from tree to tree 15—20 feet.

504 Jatropha glandulifera, ROXB. *Kan.* Kari turuka haralu gida.

Fig.—*Bot. Plates Lal-Bagh Collection.*

References.—*Pharm. Ind.*; *Dict. of Econ. Prod. of Ind.*

A shrub 4—6 ft. Foliage greenish-purple to bronze or copper; leaves large, subpeltate, not unlike the leaf of the castor-oil plant. Young stem, node, petiole, and margins of leaf, thickly furnished with sticky glandular hairs. Flower reddish-purple. Capsule and seed about the same as in the castor-oil plant.

Abundant in nullahs and waste places, but probably naturalised. The authors of *Pharmacographia Indica* publish an Indian legend as to the manner in which the plant was first introduced. It is virtually looked upon by the masses as a useless plant, although medicinal properties are occasionally attributed to its root, juice, and the oil expressed from its seed. The latter product is valued as an application to chronic ulcerations, and is straw-coloured. The plant is readily propagated from cuttings.

505 **Jatropha curcas,** LINN. *Kan.* Turuka haralu, Kadu haralu, Betta haralu, Mara haralu.

Fig.—*Bot. Plates Lal-Bagh Collection.*

References.—*Dict. of Econ. Prod. of Ind.*; *Pharm. Ind.*

The poison, physic, or purging-nut tree. An evergreen species of 15—20 ft., but most commonly seen as a bush or fencing plant, in the vicinity of villages and gardens. The Portuguese are allowed the credit of having introduced the species from Brazil, but it was probably established in India long prior to their conquest. The whole plant is very milky, and the freshly cut ends of the young twigs are popularly used by the peasantry as tooth brushes, the milky juice being considered beneficial to the teeth and gums. The milk-sap is also a popular and efficacious styptic; dried in the sun, it forms a reddish-brown substance resembling shell-lac. A decoction of the leaves applied externally will excite

the secretion of milk. The yellow oil expressed from the seed is a powerful but unsafe purgative. As cattle do not eat the plant, it is generally employed to form a fence around gardens.

Cultivation.—Readily propagated from layers and cuttings. Growth vigorous in any loose soil of ordinary quality. To obtain arborescent growth large pits are needed, with occasional irrigation during the dry season. Offsets from the rootstock and lower trunk should be removed as they appear, otherwise the leader becomes exhausted and subsides into the shrubby form.

506 Jatropha multifida, LINN.

An introduced garden bush commonly known as the "coral shrub," from the resemblance of its flowers and pedicels to pieces of red coral. The showy yellow fruit contains a poisonous seed. Cultivated in a few gardens for ornament.

507 Manihot Glaziovii, MUELL.

Fig.—*Bot. Plates Lal-Bagh Collection.*

A deciduous tree recently introduced from South America, where it is commercially known as the "Ceara rubber tree." The species has readily adapted itself to the climate of Southern India, and being of a very hardy and productive nature, it may be looked upon as one of the best vegetable colonisers of recent introduction. Having come to the country with a great reputation for usefulness as a producer of caoutchouc, it quickly obtained the advantage of being domesticated in numerous centres ranging from sea level to an altitude of 5,000 ft. In some of the coffee districts it is already looked upon as a nuisance, the reproductive growth being so rapid. At Bangalore, where there are 4,000 trees, a loose stony soil forms the best medium for quick development. It is not improbable, therefore, but this species will eventually outstrip the *Babool* in

clothing *karab* soils and rocky eminences such as abound on every side. If it does this, it needs no other recommendation to become one of the most useful gifts the land could possess. Like the *Lantana*, it annually litters the ground with decayed leaves, thus adding fertility to what might otherwise remain barren soil. Being a deciduous tree, it remains bare of leaf during the driest part of the dry season, thereby escaping the risks of drought and exposure at a critical period. While in leaf it is a handsome object, and being milky, cattle do not attack the foliage.

Local trees have not been productive of caoutchouc, although in its native place the species is said to yield commercially after the sixth year. But the great development of the rubber industry within the last decade has improved our knowledge of the true sources of this article, and it is very doubtful if Ceara rubber ever took the leading position in the market that was once assigned to it. At the present time the principal supplies of rubber are obtained from the following species :—

Central American rubber		... Castilloa elastica.
Para	„	... Hevea braziliensis.
African	„	... Landolphia, several sp.
India	„	... Ficus elastica.
Gutta percha		... Dichopsis gutta.

Local plants of *Manihot Glaziovii* were first introduced in 1879. Instances are recorded of the tuberous roots being locally prepared and eaten like the roots of cassava, this, however, requires fuller investigation. The leaves make good manure and the wood burns well.

Cultivation.—Seedlings spring up freely around the parent tree and can be transplanted into pots or nursery beds when they are 4—6 inches high. For field growth, plant in loose well-drained soil at 20 ft. apart.

508 Manihot utilissima, POHL. *Kan.* Kadu genasu, Mara genasu.

A tuberous rooted perennial attaining to the size of a shrub. Stem and leaves deciduous for a season. The fleshy roots afford bitter cassava, manioc, mandioc, and tapioca. Introduced from South America and cultivated in Indian gardens.

509 Aleurites moluccana, WILLD. *Kan.* Nat-akrodu.

Fig.—*Bedd. Fl. Sylv. t. 276.*

References.—*Dict. of Econ. Prod. of Ind.*; *Pharm. Ind.*; *Fl. of Brit. Ind.*

Generally known as the Belgaum walnut, Indian walnut, and candleberry tree. Introduced from the Pacific Islands and cultivated in this country. A large, or medium sized, evergreen tree, 40—60 feet. Often stunted in cultivation owing to the soil being unfavourable. Leaves angular to broadly rhomboid, with 3—5 lobes, whitish tomentose when young. Flowers inconspicuous, dull-white. Fruit a large drupe containing two seeds with a furrowed testa. The latter are eaten in lieu of walnuts, for which they are a very fair substitute. Of the many useful properties possessed by this tree, the production of a superior fixed oil from the seed is one of the chief, it is extracted by boiling and simple pressure, and as a dryingoil for paint, it is said to be superior to linseed oil, which is commonly used for the purpose. Being applicable to the arts generally, it is occasionally retailed as " artists oil."

The Sandwich Islanders pass a bamboo pin through a number of seeds and use them in lieu of candles. When fixed together in this way the seeds burn brightly for hours. The wood is of no value, but the bark affords a gum, and the root a brown dye.

Cultivation.—Seeds germinate in about five weeks from time of sowing, or a week earlier if placed in fermenting litter such as leaves and bed-straw. When upwards of a foot in height, the seedlings

should be planted out into large square pits at 25—30 feet apart. Being a gross feeder, the tree requires the exclusive use of a deep fertile soil, as when the roots of other trees encroach, the Belgaum walnut usually suffers and becomes stunted and unproductive in consequence.

510 Croton Tiglium, LINN. *Kan.* Japala, Nepala.

Fig.—*Bot. Plates Lal-Bagh Collection. Bentl. & Trim. Med. Pl. t. 239.*

References.—*Pharm. Ind.; Dict. of Econ. Prod. of Ind.*

This valuable plant is cultivated in the Lal-Bagh, where it grows and seeds freely and assumes the form of a small tree of 6—8 ft. The oil obtainable from the matured seed is a well known drastic purgative usually administered in capsules or small doses. It is applied externally as a rubefacient, but incautious use, or even careless handling, will cause severe blistering. As the climate of Mysore is well adapted for this cultivation it should be encouraged, with a view to including croton-oil seed as a minor product of the State forests.

The seed is very expensive, and supplies for Europe and the Colonies are mostly obtained direct from China, the country in which the plant grows wild.

Cultivation.—Seeds germinate at the rate of 30 per cent after 20 days shallow insertion in moist soil. Seedlings of 9 inches to a foot may be planted in rows, during the rains, at 6 feet apart. Watering is necessary during the first dry season, and may be required at longer intervals during the second also.

511 Croton oblongifolius, ROXB.

A small deciduous tree of the western hill region. The root-bark, leaves and fruit, possess medicinal properties, and the seeds are said to be purgative.

C. reticulatus, Heyne. *C. malabaricus*, Bedd. and *C. Lawianus*, Nimmo. are also found in the hill country.

512 **Givotia rottleriformis**, GRIFF. *Tel.* Tella puni, Tella poraku.

Fig.—*Bedd. Fl. Sylv. t. 285. Wight Ic. t. 1889.*

References.—*Gamb. Man. Timb.; Dict. of Econ. Prod. of Ind.*

A small tree of the Malnad. Branches usually very stout. "The seeds yield an oil which is valuable as a lubricant for fine machinery. Wood white, exceedingly light, very soft, but even-grained. Weight, 14 lb. per cubic foot. It is employed for making carved figures, toys, imitation fruit, boxes and other fancy articles; also for catamarans. The Kanara Gazetteer contains the further information that its surface takes paint readily." *Watt.*

513 **Ostodes zeylanica**, MUELL. *Kan.* Sotege.

Fig.—*Bedd. Fl. Sylv. t. 274.*

A large tree of the Hassan forests, where it is confined to the moist evergreen belt. Wood unknown. Fruit not unlike the fruit of *Manihot Glaziovii*. Botanical specimens are required for the local herbarium. Compare Anderson's *Sotaga marglee* with this.

514 **Trewia nudiflora**, LINN. *Kan.* Kat-kumbala.

Fig.—*Wight. Ic. t. 1870, 1871.*

References.—*Brand. For. Fl. 443. Gamb. Man. Timb. 359.*

A lofty tree of rapid growth, 60—80 ft. At Bangalore, the leaves are deciduous for about 20 days in February or March, in a moister region they would possibly be almost evergreen, opposite, stout, long-petiolate, cordate or rounded at the base, acuminate, considerably larger than the leaf of the

Portia tree,—*Huvarusi*—to which there is some resemblance in outline and texture. Wood soft, white, used in Northern India to make the cylinders of native drums. The bark of the root has curative properties, and is said to be efficacious in the treatment of gout. It is perhaps locally used in the form of a poultice. The diœcious flowers appear a few days in advance of the young leaves, and are the first outward indication of returning growth. The pedicels of the male flower are so short that the drooping inflorescence reminds one of the catkins of a willow tree. Fruit fleshy or nearly woody, the size of a gooseberry, exceedingly abundant and falling thickly to the ground for upwards of a month.

Cultivation.—Deposited in small heaps of sweepings and rubbish, the seeds soon germinate, nor are they unfertile when sown in nursery beds according to approved methods. This would make a good shade tree for country roads were it not for the falling fruit, which litters the ground and causes a nuisance. To obtain full growth, this large tree should be planted at 50 feet apart.

515 Mallotus philippinensis, MUELL. *Kan.* Kunkumada mara, Chandra hittu, Huli chellu, Vasare.

Fig.—*Bedd. Fl. Sylv. t. 289. Bentl. & Trim. t. 236.*

References—*Pharm. Ind.*; *Dict. of Econ. Prod. of Ind.*

The Kamála dye tree. Small, or at best medium sized, evergreen, except in abnormally dry seasons when the leaves are all shed for a short time. The species is very abundant in some parts of the mixed zone lying nearest to the evergreen belt, and is detected by its peculiar musty odour when the fruit is forming. The latter begins to be covered from an early stage by a glandular powder of a bright crimson colour. Shaken from the ripe fruit, on cloths,

this powder affords the product called Kamála dye, an esteemed article of ancient times, but now superseded to a great extent by cheap and unsatisfactory dyes. Kamála is still in demand however, not only for dyeing silk, but as an anthelmintic of exceptional merit; it is a minor product of the State forests, and is generally known in the South by the Tamil name *Kapli*. The wood warps and shrinks so badly that it is only fit for fuel. Weight 48 lb. per cubic foot. *Mallotus albus*, Muell. *M. muricatus*, Bedd, *M. Lawii*, Muell. and *M. repandus*, Muell. are represented in the Malnad forests, but we possess no local information as to the quantity or utility of these trees.

Cultivation.—As the Kamála tree requires a good deal of moisture it succeeds best near the hills, on the banks of rivers and channels, and under the tank-bunds. But it is also found at intervals throughout the province, and is reproduced from root offsets. Seeds collected from local trees are very imperfect and rarely germinate. In such cases it is often advantageous to procure seed from localities where the tree is known to flourish well.

516 Macaranga indica, WIGHT.

Fig.—*Wight Ic. t. 1883. 1949, f. 2. Bedd. Fl. Sylv. t. 287.*

An evergreen tree of 50 to 60 feet. Found in Coorg, and not uncommon in the Western Malnad. Branchlets very stout. Leaves large, deltoid-ovate, peltate, and entire. Fruit very small, globose or rarely didymous. Local uses unknown.

517 Macaranga Roxburghii, WIGHT. *Kan.* Kanchu pranthi, Chenthakanni.

Fig.—*Wight Ic. t. 1949, f. 4. & 817. Bedd. Fl. Sylv. t. 287.*

Reference.—*Fl. of Brit. Ind.*

A small evergreen tree of quick growth and resinous nature. Often found in forest clearings and as a shade to coffee. Easily distinguished from allied genera by its handsome peltate leaves. Abundant in Coorg and Western Mysore. A medicinal gum or reddish clammy secretion having the odour of turpentine, exudes from the young shoots and fruit. This product is said to be used for taking impressions and sizing paper. The wood is soft and useless. Flowers small, green, in dense panicles. Fruit globose, the size of a pea.

518 Ricinus communis, LINN. *Kan.* Haralu gida.

The castor-oil plant. There are three distinct varieties cultivated in the fields as a dry crop, *viz.*, the *dodda*—large—*chittu*—small—and *kempu*, red. The stalks are utilised as fuel by the poorer classes.

519 Gelonium lanceolatum, WILLD.

Fig.—*Wight. Ic. t. 1867.*

References.—*Gamb. Man. Timb.*; *Dict. of Econ. Prod. of Ind.*

An evergreen tree of conical growth, 30—35 ft. Leaves numerous, small, alternate, coriaceous, oblong-lanceolate to ovate but never lanceolate. Staminate flowers small, crowded at the nodes, creamy-white. The male tree is usually very symmetrical, and tapers gradually from a wide base to a sharp pointed apex. A dark green foliage heightens the effect of this regular outline, and makes the tree an attractive object for scenic effect. —In Coorg, there is a tree called *Garcinia xanthochymus*, which grows in exactly the same form and is even finer in foliage and outline.—The female tree formerly in the collection of the Botanical Gardens was less conical in form, and looked more like a huge shrub branching thickly from the base. That however may have been exceptional in the solitary specimen referred to. The male tree, of which there are several specimens about Bangalore, always

assumes the conical form. Wood yellow, smooth, even-grained, and exceptionally strong, said to be suitable for house-building.

Cultivation.—It is difficult to procure good seed of this tree, and the hard nature of the wood is inimical to the customary modes of propagation by division. The best course is to obtain seed or seedlings direct from the Malnad where the species grows rather abundantly. When the seedlings are a foot or more in height, plant in rows at 25 feet apart. A somewhat moist situation having a rainfall of 70 to 100 inches produces the best growth. In drier localities, irrigation would be needed occasionally during rainless months. Propagate from layers if seed cannot be had.

520 Sapium sebiferum, Roxb.

The Chinese tallow tree. Cultivated in the Botanical Gardens and in the Hebbal plantation. For the introduction of this important species we are indebted to the Agri Horticultural Society of Lahore, from whom seeds were received in the year 1877. It is a small deciduous tree of quick growth and simple requirements. Each fruit—capsule—contains 3—4 seeds each the size of a small haricot bean, and invested by a whitish sebaceous substance which is said to be a pure vegetable tallow. The Chinese manufacture candles out of this substance and hence the vulgar designation 'tallow tree.'

"The tallow is separated by steaming the seeds in tubs with convex open-wicker bottoms, placed over cauldrons of boiling water. With trifling exception, the candles used by the Chinese in their religious ceremonies are made by dipping of the tallow of the Stillingia." *Official Guide to the Royal Gardens Kew.*

Cultivation.—Local trees produce seed which germinates readily. When the seedlings are large

enough, plant them in any loose soil of moderate quality at 15 feet apart. If the soil is not loose, it is desirable to make large pits so as to induce vigorous growth from the commencement.

521 Sapium discolor, MUELL.

An ornamental shrub introduced from the Straits Settlements. Cultivated in the Lal Bagh.

522 Excœcaria robusta, HOOK.

A small evergreen tree of the Malnad and Coorg. There is a specimen cultivated in the Botanical Gardens. Uses unknown.

523 Excœcaria crenulata, WIGHT.

Fig.—*Wight. Ic. t. 1865.*

Found in the same region as the last named, but less vigorous in habit and having serrate or crenulated leaves. The genus is more or less poisonous.

524 Baloghia lucida, ENDL.

Introduced from the east coast of Australia, where it is called the "scrub bloodwood." A small evergreen tree 30 to 40 feet. Quality of timber unknown. Seedlings are occasionally raised in the Lal-Bagh, but they have not been established in local growth.

525 Hura crepitans, LINN.

The sandbox tree of tropical South America. This exotic species has been established in the Botanical Gardens for 30 years, where it flowers and fruits freely every year. The ornamental capsules dehice with considerable noise, scattering the seeds contained in their several compartments far and wide.

It is a small evergreen tree with dark green leaves and a thickly muricated trunk. A purgative oil is contained in the seed.

526 Hevea braziliensis, MUELL. ARG.

The Para rubber tree. Indigenous to Para and other parts of tropical Brazil. Introduced to

Bangalore in 1891. The maidan climate is much too dry for this species, but it would, no doubt, become a valuable forest product in the warm steamy valleys of the Malnad, in moist sholas at the foot of the Baba Budan hills, and in several hill tracts where the atmosphere is comparatively moist and steamy all the year round. The conditions most favourable to growth in Brazil are uniformity of temperature, the mean being 81° F. and the greatest heat 95° F., with a slimy soil consisting mostly of soft alluvial deposits. Plantations are not recommended where the mean temperature falls below 60° F., but in the valleys referred to above, the temperature is uniformly higher. For cultivation in this country, Sir D. Brandis thinks that the districts of Kanara, Malabar, Travancore, and the Burma coast from Moulmein southwards, offer the most suitable conditions, and he draws special attention in this respect to the moist evergreen forests at the foot of the Coorg Ghāts and in Kanara. Para rubber is worth 4 shillings a pound, and under the most favourable conditions, a tree will yield 4—6 imperial pints of milk-sap per annum. Properly placed with regard to soil and climate, the species grows very rapidly, often attaining a height of 20—30 feet in three years. But the trees should not be tapped for caoutchouc until they are nearly 3 feet in circumference at the base. For details as to the mode of tapping, &c., the reader should see Dr. Watt's Dictionary of the Economic Products of India. The tree is strongly recommended for trial in the evergreen sholas of Western Mysore.

Cultivation.—The Para rubber tree is propagated both from seed and cuttings, but Mr. Jamieson of Ootacamund remarks that the latter are apt to damp off during the first few days of insertion if constant personal attention is not devoted to the operation. When seedlings or rooted cuttings are a foot high,

plant them out permanently at 20 feet apart. Virgin forest soil, alluvial mud, and moist clay, are all suitable ingredients for the healthy sustenance of the species, but the surrounding atmosphere should also be comparatively moist all the year round.

527 Hevea Spruceana, MUELL.

A species, somewhat similar to the above and said to yield good rubber. Introduced to the Botanical Gardens in 1887. Indigenous to the valley of the Mazaruni River. Treatment the same as for *H. braziliensis.*

528 Anda Gomesii, A. JUSS.

This handsome Brazilian tree is fairly established in Bangalore, where the large ash-coloured fruit is an object of curiosity. The latter is something like a cocoa-nut in form, but smaller and slightly 4 angled. In Brazil, a pale yellow oil, having cathartic properties, is expressed from the seed. Being bare of leaf for only about a fortnight, it forms a good avenue tree, and in moister climates than Bangalore it would possibly become evergreen. The quality of the wood has not been tested in Mysore.

Cultivation.--Carefully removed from the capsules and placed in loose soil, the seeds germinate within 20 days at the rate of 60 per cent. Buried with the capsule, the seeds take a long time to break through and are very uncertain. Each capsule contains 2—3 large seeds. For avenue planting, the final trees should stand at 45 feet apart. A moist, but at the same time well drained soil is the best.

LXVI. URTICACEÆ.

529 Holoptelia integrifolia, PLANCH. *Kan.* Rasbija, Thapsi, Kaladri.

Fig.—*Wight Ic. t. 1968. Bedd. Fl. Sylv. t. 310.*
References.—*Brand. For. Fl. 431. Gamb. Man. Timb. 342.*

The entire-leaved elm. A large deciduous tree of the drier Malnad. Abundant in Hassan, Kadur, and Shimoga, throughout the mixed and deciduous belts. Wood yellow or light brown with no definition of heartwood, soft, open-grained, but strong. Weight 37 lb. per cubic foot. Mostly utilised for making charcoal,but also for house-building, country carts, and occasionally for carving. The green leaves and young shoots are greedily eaten by cattle, although the smell is offensive. The whitish-grey bark falls off in large scales.

Cultivation.—This tree requires good drainage as the roots are very impatient of stagnant water. Sandy soil or loam on a gravelly subsoil is suitable. Propagate from seeds and cuttings.

530 Celtis Wightii, PLANCH. *Tel.* Tella—kaka—mushti.

Fig.—*Wight. Ic. t. 1969.*

Reference.—*Gamb. Man. Timb. 343.*

A large or medium sized tree of the Western Ghâts, where it is abundant on the lower slopes and in sholas. Branches stiff, glabrous or tomentose. Leaves leathery, turning yellow in age, bifarious, straight, oblong or elliptic-oblong, with three conspicuous nerves from base to apex. Stipules peltate, caducous. Flower pale bluish. Drupe racemed, ellipsoid, half an inch long, often 2-cuspidate, scarlet to black. Wood said to be close-grained and durable. Weight 53 lb. per cubic foot. This species is much confounded with the "charcoal tree," *Trema orientalis.* But the latter is smaller in all its parts, of shorter duration and having the underside of the leaf covered by a silvery pubescence.

531 Trema orientalis, BLUME. *Kan.* Bendu mara, Gorklu, Goorcul.

Fig.—*Wight Ic. t. 1971.*

References.—*Kurz. For. Fl. 469. Dict. of Econ. Prod. of Ind.; Fl. of Brit. Ind.*

The charcoal tree. A small or medium sized evergreen species. Said to be short-lived, although there are trees at Bangalore of 25 years of age. When openings are made in the virgin forest this tree appears somewhat mysteriously, with the succeeding growth. A similar coincidence happens in the case of the castor oil plant, and is, no doubt, due to some property of the seed which retards germination in the absence of sufficient exposure or light. The spontaneous growth in coffee clearings was formerly allowed to remain as shade to the cultivation, but it is now looked upon as being prejudicial to coffee, and is generally removed. Leaves silvery on the underside. Flowers small, diœcious, crowded on the young woody shoots. Drupe the size of a pigeon pea, and bearing a strong resemblance to the fruit of *Lantana*, greyish-black when ripe. Wood soft and pithy, makes excellent charcoal, as also yokes and rafters, when properly smoked and seasoned.

Cultivation.—This tree is most difficult to propagate by artificial methods, as neither the seed nor cuttings vegetate readily. The best plan is to transplant offsets during the rains. But under the conditions already explained, the species is very reproductive.

532 Gironniera reticulata, THWAITES. ***Kan.*** Gabbu chekke, Narakabhutali, ***Tam.*** Koditani. ***Indian Bazaars.*** Narakiyaood.

Fig.—*Bedd. Fl. Sylv. t. 313.*

References.—*Pharm. Ind.; Dict. of Econ. Prod. of Ind.*

Beddome describes this as a valuable timber tree ascending the Travancore and Tinnevelly Ghâts to 3,000 ft. It is entered as a Mysore species with some hesitation, although there is little doubt of its existence on the south-west frontier. The wood

possesses medicinal properties, and is well known in Ceylon and the South of India for its unpleasant odour, the bazaar name signifying "hellish incense."

"The tree is called by the Dutch *Strunthout*, and by the Cingalese *Urenne*, on account of its disgusting odour, which resides especially in the thick stem and the larger branches. The smell of it so perfectly resembles that of human ordure, that one cannot perceive the smallest difference between them. When the tree is rasped, and the raspings are sprinkled with water, the stench is quite intolerable.

It is nevertheless taken internally by the Cingalese as an efficacious remedy. When scraped fine and mixed with lemon juice, it is taken internally as a purifier of the blood in itch and other cutaneous eruptions, the body being at the same time anointed with it externally." *Thunberg's Travels IV., 234.*

Botanical specimens of this curious tree should be secured by the Malnad officials for preservation in the herbarium.

533 Cannabis sativa, LINN. *Kan.* Bangi gida.

Fig.—*Bot. Plates Lal-Bagh Collection. Bentl. & Trim. Med. Pl. t. 231.*

References.—*Pharm. Ind.*; *Dict. of Econ. Prod. of Ind.*

The hemp plant. This intensely narcotic annual is often seen in backyards and rubbish heaps, although its open cultivation is strictly prohibited by Government.

The works quoted above give very exhaustive articles on the history, distribution, and economy of the species.

534 Streblus asper, LOUR. *Kan.* Mitli mara.

Fig.—*Wight Ic. t. 1961; Bedd. For. Man. 221, 26, f. l.*

References.—*Kew Bulletin 1888, pp. 81—84. Kurz. For. Fl. 464.*

This shrub or small tree is mostly confined to the drier parts of the maidan, where it is not uncommonly found in scrub jungle and by the sides of nullahs. It is plentiful in some parts of the Bangalore Taluk, but seldom attains to more than 12 feet in height. Suitable for hedging, but very slow of growth. Medicinal properties are attributed to the root and milk-sap, the latter being considered a good local remedy for sole heels and chapped hands. The young twigs are used as tooth brushes, while larger branches are stuck over the roofs of houses to ward off lightning. But the chief commercial value of the species is found in the bark, from which considerable quantities of useful paper is made in Siam. It is the *Tonkhoi* of that region, the industrial importance of which is fully reported in the "Kew Bulletin" quoted at the head of this paragraph. When paper-mills are established in Mysore, it will be interesting to test the local value of *Mitli chekke*, with a view to its possible utility as a suitable material for the manufacture of paper.

Cultivation.—Local attempts to propagate the species from seed have not been successful, but the tree throws up numerous suckers, and with care these can be transplanted during the rains. Growth is somewhat slow.

535 Broussonetia papyrifera, Vent.

The paper-mulberry tree. This species is indigenous to China, Japan, and some of the Islands in the Pacific, in which places it formerly ranked high as a fibre plant, and afforded from its inner bark the article known as *Tapa* cloth. But even in the South Sea Islands the latter is now abandoned in favor of cheap European fabrics of mostly gaudy

colours. The tree was established in the Lal-Bagh in 1881, since which it has flourished in growth and increased rapidly. But as paper mills depend chiefly on rags, straw, and grasses for their raw material, it is doubtful whether trees of this class could be profitably cultivated for the manufacture of paper.

Cultivation.—Cuttings of all sizes take root without much effort, only requiring to be kept in a moist situation for a few weeks. Grown in moist but porous land, the paper mulberry quickly attains a height of 20—30 feet and is rather ornamental. For exclusive culture, plant at 10 feet apart.

536 Morus indica, LINN. *Kan.* Reshme or Kambali gida.

Fig.—*Wight Ic. t. 674.*

References.—*Brandis For. Fl. 408; Dict. of Econ. Prod. of Ind.*

The Indian or silk-worm mulberry. Usually seen as a shrub in cultivation, but under exceptional conditions attaining to a small tree. Leaves ovate, acuminate, sharply serrate, shining; in matured specimens, lobed and scaberulous. Fruit red. Largely cultivated in the Closepet and Channapatna Taluks to feed the silkworm. The species *M. alba,* Linn. *M. atropurpurea,* Roxb. and *M. nigra,* Linn. are cultivated occasionally in gardens for their fruit. The first named is also cultivated in the silk industry, although not to the same extent as *M. indica,* in Mysore. Mulberry leaves afford the best food for the domesticated silkworm, *Bombyx Mori.* The fruit borne by most of the species is much prized in the south of Europe and in the extreme north of India, Cashmere, and Afghanistan, but it is not so much esteemed in tropical India where the climate is less favourable and the mode of cultivation inferior. The arborescent species have fine strong

timber which is said to be durable under ground. Fibre, gum, and medicine, are well known products of the genus.

Cultivation.—Mulberry plants are easily raised from cuttings, and these, as also the sapling and matured tree, require a moist situation for healthy growth. Strongly rooted plants are also somewhat gross feeders requiring rich plant food in the form of sheep and farm-yard manures. With these advantages, and a systematic mode of treatment during the extreme seasons, the mulberry could be made more productive of fruit than we usually see it on the plateau of Mysore.

537 Ficus gibbosa var. parasitica, KOEN. *Kan.* Goddu mitli mara.

Fig.—*King Fic. Pl. 2. b.; Wight Ic. t. 652.*

Reference.—*Fl. of Brit. Ind.*

A small evergreen tree found in the clefts of rocks and on stony hills. The rough leaves vary a good deal in size and form, and are occasionally used to polish household utensils. Fruit produced singly or in pairs at the base of the leaves, and on slender stalks nearly equal to the length of the receptacle, slightly hairy, and not larger than a small pea. The root-bark possesses medicinal properties.

538 Ficus Dalhousiæ, MIQ.

Fig.—*King Fic. Pl. 11.*

A tree, 30-40 feet. Young shoots softly pubescent. Leaves subcoriaceous, rather long petiolate, broadly ovate, with acute apex, base cordate, nerves prominent on the under side. Fruit in axillary pairs, shortly pedunculate, obovoid, densely hairy, the size of a dove's egg. This species is mostly confined to the Malnad, where it is probably evergreen. Uses unknown.

539 Ficus Bengalensis, LINN. *Kan.* Ala, Alada mara.

Fig.—*King Fic. Pl. 13. Wight Ic. t. 1989.*

References.—*Brand. For. Fl. 412; Dict. of Econ. Prod. of Ind.*

The proper banyan tree of India. A large umbrageous species attaining to 80 and, in exceptional cases, 100 feet. Leaves deciduous, petiolate, alternate, coriaceous, ovate-rotund to elliptic, apex blunt; average blade 5×8 in. Aerial roots abundant or otherwise according to age and situation. Fruit in sessile pairs, orange-red to reddish, the size of a gooseberry. The banyan is so universally known that it calls for no special description here, and being venerated by the Hindus, it is extensively planted in most parts of India. Dr. King remarks, however, that it is "wild only in the Sub-Himalayan forests and on the lower slopes of the hill ranges of Southern India." It is asserted by the same authority that the tendency to send down aerial roots from the branches reaches its highest development in the banyan. At Bangalore, the tree remains bare of leaf for 20 days in March or beginning of April. The banyan, like many species of the genus *Ficus*, often commences life as an epiphyte on the body of some other tree, and the curious condition of seeing two different trees growing, as it were, from a common root is mostly due to this investment. The Hindus call it natural marriage and will rarely separate such a union, although the fig prevails eventually and strangles the tree from which it derived its early support. Seeds masticated by crows and other birds are plentifully dropped into the clefts of various trees; in the course of time some of these germinate and hence the result here depicted.

Gigantic and altogether very remarkable specimens of the banyan tree exist at Mhasve, Satara Zillah, in the Bombay Presidency, and in the Royal Botanical Gardens, Calcutta. Correct measurements

of these famous trees will be found in Dr. Geo. King's splendid work on "the species of *Ficus* of the Indo-Malayan and Chinese countries."

Wood of little value except under submersion, when it is sufficiently durable to be used for the curbs and planking of wells. Weight about 37 lb. per cubic foot. The aerial root-drops afford an elastic timber which is occasionally used for tent-poles, cart yokes, and such like. In deep soil, the tree is considered a good shade for coffee, and the immense number of leaves which are annually shed from large trees provide ample material for enriching the land.

The milk-sap is extensively used in the preparation of birdlime. It is also applied, in the crude state, to ulcers, sores, and bruises. Medicinal properties are attributed to the root also. The young leaves are stitched together to serve food upon, in lieu of plates.

Cultivation.—Stake cuttings soon take root even in poor soils, but the finest specimens, whether from seed or cuttings, are found in good land. The rapid development of aerial roots is undesirable in an avenue or roadside tree, otherwise the banyan is admirably adapted for the latter purpose and will often succeed where other trees fail. Seedlings are preferable for roadside planting as they grow more rapidly and become finer trees than such as are raised from cuttings. The species is popularly planted near shrines and in village topes. Seeds rarely germinate under artificial treatment, but seedlings are always plentiful in the clefts of trees, in old walls, and by the sides of nullahs.

540 Ficus mysorensis, HEYNE. *Kan.* Goni mara.
King Fic. Pl. 14, 15.

References.—*Fl. of Brit. Ind.*; *Dict. of Econ. Prod. of Ind.*

Of indigenous fig trees, this is the largest growing species in the Mysore country. In good situations

it is not unusual to find specimens with a trunk measurement of 30 feet in circumference and head diameter (through the branches) of 150 feet. There are two such trees in the Botanical Gardens at Bangalore.

A wide-spreading tree affording dense shade and attaining a height of 70—100 feet. Bare of leaf in March or beginning of April for 15 days, or longer if the ground is dry and rain holds off. Leaves deciduous, alternate, petiolate, covered underneath—as also the young shoots and receptacles—by a thick rufous tomentum, eventually coriaceous, ovate to ovate-elliptic; average blade 5 × 8 in. Fruit in sessile pairs, oblong to obovate, the size of a damson plum, or in the variety *subrepanda* considerably larger, orange to orange-red, short-lived, and enormously prolific. Flying foxes devour the ripe fruit in great quantity.

Wood soft, and useless for building, but when thoroughly dried it burns fairly well. Weight about 35 lb. per. cubic foot. A coarse fibre is obtained from the liber or inner bark, and the coagulated milk-sap is used in native medicine. The *Goni* is considered a good shade-tree for coffee, while the decayed foliage and fruit afford ample material for manuring the land. ***Ficus*** *mysorensis* var. *pubescens*, Roth. is indigenous to the strictly Malnad regions of Mysore. It only differs from the specific form in being smaller, and more hairy in all its parts. Nothing has been recorded of its uses. It may be the *Hub goni* of planters.

Cultivation.—The same as for the banyan. It will be observed that the finest trees are found in depressions where the soil is comparatively deep and moist, as in valleys, at the foot of tank-bunds, and in deep nallahs. As a roadside tree, this species is preferable to the banyan because it grows faster, affords denser shade, and gives off no aerial roots to

speak of. Stake-cuttings soon take root and become large trees. Seeds germinate under careful treatment, but often fail from slight mismanagement.

541 **Ficus tomentosa,** Roxb. *Kan.* Kallalada mara, Kalarali ?

Fig.—*King Fic. Pl. 18; Wight Ic. t. 647.*

References.—*Fl. of Brit. Ind.; Dict. of Econ. Prod. of Ind.*

A large umbrageous tree, with small aerial roots suspended from the lower branches. Young parts, including the receptacle and the leaves underneath, densely covered by a rusty-grey tomentum. Leaves crowded towards the ends of the branches, deciduous, petiolate, ovate-elliptic, slightly cordate, eventually coriaceous; average blade $3\frac{1}{4} \times 5$ in. Fruit in sessile pairs, pisiform, rusty grey, the size of a large pea. Nothing has been recorded as to the economic merits of this tree, although in some sparsely wooded Taluks it is, no doubt, useful as a convenient source of fuel. It is peculiar to the drier parts of the country, and is reproductive from seed deposited by birds, flying foxes, and other small animals.

542 **Ficus indica,** Linn. *Kan.* Gilke mara ?

Fig.—*King Fic. Pl. 45, 83b.*

References.—*Fl. of Brit. Ind.; Dict. of Econ. Prod. of Ind.*

A spreading tree of 35—45 feet. Foliage glabrous, shining, and copper-tinted when young. Aerial roots usually abundant from the lower limbs. Often called the banyan, but easily distinguished from the latter by its smaller parts, especially the leaves and fruit. Leaves shortly petiolate, copper to Mars-orange coloured when young, broadly to narrowly oblong, with an acute or blunt apex, very variable in size and form; average blade $2\frac{1}{2} \times 5$ in. Fruit in crowded sessile pairs, globular, yellowish-

red, the size of a pea. Commonly planted at the roadsides, although not one of the best for affording a high canopy of shade to the traveller. In this respect, it is inferior to the last three species.

Cultivation.—The same as for the *Banyan* and *Goni.*

543 Ficus Benjamina, LINN.

Fig.—*King Fic. Pl. 52, 83b.; Bot. Plates Lal-Bagh Collection. Wight. Ic t. 658.*

References.—*Bedd. For. Man. 223; Kurz. For. Fl. 446.; Dict. of Econ. Prod. of Ind.*

Commonly known in India as the "Java fig." A large evergreen tree with drooping branchlets. Aerial roots stem-clasping, or practically suppressed. For rapid growth, shade, and scenic effect, this splendid tree surpasses all the figs. Originally introduced from the Malayan Peninsula and now rather extensively cultivated in Indian pleasure grounds. It forms the central avenue in the Cubbon Park at Bangalore, and unique specimens, some of which are not more than 12—15 years old, may be seen at the Lal-Bagh and elsewhere. Leaves alternate, shortly petiolate, glabrous, shining, broadly ovate-elliptic, shortly acuminate; average blade $1\frac{1}{2} \times 2\frac{1}{2}$ in. Fruit in scattered, or occasionally crowded sessile pairs, rusty-red, the size of a pea. Wood nicely mottled and moderately hard when well seasoned. Weight 34 lb. per cubic foot. Gamble states that lac is produced on the tree in Assam. The Botanical Gardens contain a single large specimen of *Ficus Benjamina* var. *comosa*, which, in foliage and bark, is almost identical with the specific form; but growth is not so vigorous, while the receptacle is the size of a small gooseberry and rich orange to golden yellow in colour. Nothing is recorded of the properties of this wood, but

being of slow growth, it is possibly close-grained and more durable than the timber of most fig trees.

Cultivation.—The Java fig and its variety described above are easily propagated from layers, which should be taken off during the rainy season. A deep loose soil suits the species admirably, and swampy ground is soon dried by it. This is due to the root-limbs rising progressively above the surface, so that in the course of a few years the ground level is raised sufficiently to facilitate natural drainage. Plant in large pits at 50 feet apart. On poor gravelly soils, the tree makes little progress. Local efforts to raise seedlings have not met with success, but the directions given for sowing seed under the next species should apply more or less successfully to all the figs.

544 **Ficus elastica**, Roxb.

Fig.—*King Fic Pl. 45, 54; Wight. Ic. t. 663.*
References.—*Brand. For. Fl. 417; Kurz. For. Fl. 444; Dict. of Econ. Prod. of Ind.*

The India rubber tree. Cultivated in the Lal-Bagh and sparsely in some of the coffee districts. Indigenous to the base of the Eastern Himalaya, the Khasi Hills, Assam, Burmah, and the Malayan region. A handsome evergreen tree of 40—60 feet. With or without aerial roots according to locality. Leaves alternate, shortly petiolate, coriaceous, rigid, shining, oblong to elliptic, with an acute apex; venation exceptionally fine and regular, average blade, in a full grown tree, $2\frac{3}{4} \times 7$ in. In vigorous saplings, the leaf is much larger. Stipules very large at the tips of the shoots, caducous. Fruit in sessile pairs over the leaf scars, oblong, pale yellow, the size of a large pea.

Timber of no value. Weight 43 lb. per cubic foot. The India rubber of commerce is prepared from the milk-sap of this species.

"A tree of *F. elastica* is tapped in Assam when 25 years old. After 50 years the yield is about 40 lbs. of caoutchouc every third year." *Markham and Collins.* Moist sholas (valleys) leading up to the Malnad are well adapted for the profitable cultivation of this industrial tree, and it is the work of the Forest Department to establish the species in such localities.

Cultivation.—In the first stages of development, the India rubber seedling is very epiphytic in its nature, and naturally clings to moist but at the sametime well-drained crevices in rocks and trees. Stagnation of water appears to kill as effectually as the complete drying up of the material in which the seed is deposited, so that it is only with great care that seedlings are raised artificially.

Cuttings root freely in bottom heat, and layers can be rooted and detached in the course of 3—4 months. In Assam, the prevailing practice is to plant in clearances within the virgin forest, each clearance being a line or strip 40 feet in width, with an intervening belt of natural forest 60 feet in width, the object being to retain moisture around the seedlings. When a foot and upwards in height, the latter are planted on small mounds at 25 feet apart. Colonel Campbell Walker, Conservator of Forests, Madras, gives the following Memorandum on the methods employed in cultivating the India Rubber tree in the Malabar District:—

"The method of sowing is as follows:—

"A seed bed, 10 feet long × 2½ feet broad, should be prepared. The soil should first be well forked over to a depth of at least 18 inches, well pulverised and mixed with sifted stable manure (old), ashes, and sand. The proportion of mould, sand, ashes, and manure should be as follows: one of mould, two of sand, one of ashes, one of manure. All these

materials should be sifted through a wire-gauze sieve. The bed should be raised 4 inches above the ground, and the surface made perfectly level and smooth.

"On the top of this layer 1 inch in thickness of stable manure and river sand, in equal proportions, should be sifted, and over that a layer $\frac{1}{4}$ inch in thickness of brick or tile dust also sifted. The dried fruit should now be rubbed to powder between the hands, and then sifted and sown thickly over the brick dust. After sowing the seed, a flat, smooth piece of board should be gently pressed all over the bed, the surface of which should be in this manner made as level and smooth as the surface of a billiard table.

"The bed having been prepared and seed sown, it should be watered. A small garden engine should be stationed close to the bed, and a very fine spray must be allowed to fall gently over the bed till it is well moistened. This can be done by placing the thumb of the left hand over the muzzle of the delivery pipe of the engine. It is essential that none of the seed, which all lies on the surface, should be washed away. A sheet of galvanised iron, or any efficient substitute, should now be placed about 6 inches above the bed, so that no rain water may fall upon or injure the surface of the bed, which must be kept always *damp*, and in dry weather three or even four waterings a day may be necessary.

"In about 10 days the young seed should germinate freely, and it will be necessary to admit sunlight from three to six hours daily. In cloudy weather the young plants may be exposed freely all day, and a *very* light drizzle will not hurt them; but, if the upper surface of the bed is once allowed to dry, or is broken up by the heavy rain, the young plants will perish. The gardener in charge, who

should be a trustworthy man, should be directed to remove the covering of the bed morning and evening, and give the young plants a free allowance of sunshine daily.

"Several nursery beds should now be prepared. They should be heavily manured, and 4 inches of the surface made of sifted soil. As in the case of seed bed, a $\frac{1}{8}$ inch sifted brick or tile dust will be found necessary. Into these nursery beds, delicate young seedlings should be carefully pricked out 1 foot apart, with a porcupine quill or a strip of bamboo, when $\frac{1}{8}$ inch in height. In these nursery beds, the young plants should remain till 3 feet high, and then be planted out permanently from 40 to 60 feet apart, in pits 3×3 feet."

545 Ficus Trimeni, KING.

Fig.—*King Fic. Pl. 55.*

This fine species will probably be found in the Malnad. It is one of the largest with a few aerial roots. Foliage glabrous and shining. Leaves petiolate,—petiole 1 in. or less,—coriaceous, ovate-elliptic, acute or bluntish; average blade, in matured trees, 2×3½ in. Fruit in sessile pairs, globular, the size of an English pea. This is possibly Mr. Graham Anderson's *Hub Busree*, of which the writer would like to examine specimens.

546 Ficus retusa, LINN. *Kan.* Pilala, Jivi, Pinval, Pilaka? *Tel.* Yerra juvi.

Fig.—*King Fic. Pl. 61, 62; Wight Ic. t. 642.*

References.—*Fl. of Brit. Ind.; Dict. of Econ. Prod. of Ind.; Pharm. Ind.*

A large evergreen tree of variable character, the extreme forms being occasionally mistaken for distinct species. Planted throughout the maidan and plentiful around the margins of the Malnad forests and in Coorg. Aerial roots not very numerous.

Leaves—in the typical form—alternate, shortly petiolate, glabrous, ovate-rotund to obovate-rotund, apex blunt; average blade $3 \times 4\frac{1}{4}$ in. Fruit in sessile pairs, hairy, the size of a pea, dull yellow to reddish when ripe.

This is a good avenue tree, but rather slow of growth. Wood close-grained, moderately hard, and nicely mottled; used as fuel, but Watt suggests that it might be utilised for doors, panels and such like. Weight 40 lb. per cubic foot. Pounded into a poultice, which is applied to the affected part, the leaves and tender bark afford a good native remedy for rheumatism. The milk-sap of the liber has a reputation in the treatment of liver complaint. The tree affords good shade to coffee, but is seldom met with in the interior of the evergreen jungles. *Ficus retusa* var. *nitida*, Thunb., only differs from the above in form of leaf and quantity of aerial roots. The latter are numerous, while the leaves are mostly small, ovate to rhomboid-elliptic; average blade $1\frac{1}{4} \times 2\frac{1}{2}$ in. Fruit slightly smaller than in *retusa*, but the same otherwise.

Cultivation.—*F. retusa*, and the variety *nitida*, are easily raised from both large and small cuttings, but in the treatment of the latter, a hot-bed is necessary with plenty of bottom heat. It may be stated here that small cuttings of nearly all the species of *Ficus* can be quickly rooted in this way.

547 Ficus Talboti, King.

Fig.—*King Fic. Pl. 63.*

This species has not been reported nor seen, but the "Forests of Canara" are said, by Dr. King, to be its habitat. It is a large evergreen tree with shining leaves. Very near *retusa*, but differing in the form and venation of the leaf. Uses unknown.

548 Ficus nervosa, Roth Nov. sp. 338.

Fig.—*King Fic. Pl. 65; Wight, Ic. t. 660.*

Being indigenous to the hill ranges of Southern India, this species should be found in the local evergreen zone. A tree; leaves petiolate, oblong-lanceolate, acuminate, prominently nerved; average blade $2\frac{1}{2} \times 6\frac{1}{4}$ in. Fruit on longish slender stalks—pedunculate—globose, puberulous, the size of a black currant. Uses unknown. *Ficus nervosa* var. *minor*, is smaller in all its parts and more puberulous. Both forms are probably indigenous to the western hills of Mysore at an elevation of 4,000 to 5,000 feet.

549 Ficus Rumphii, BLUME. *Kan.* Betta arali, Kad arali, Betta ragi.

Fig.—*King. Fic. Pl. 67*; *Wight Ic. t. 640.*

References.—*Pharm. Ind.*; *Dict. of Econ. Prod. of Ind*;

A deciduous tree of the mixed zone and subalpine range. The vernacular names simply indicate the hill form of *F. religiosa* to which the species bears a strong resemblance, although never such a grand tree. The leaves are slightly smaller, shortly acuminate, narrower at the base and with a shorter petiole than in *F. religiosa.* The milk-sap is much prized by the villagers in the treatment of rheumatism. "The juice is used in the Concan to kill worms, and is given internally with turmeric, pepper and ghi, in pills, the size of a pea, for the relief of asthma: it causes vomiting. The juice is also burned in a closed vessel with the flowers of *Mudar*, and four gunja's weight of the ashes, mixed with honey ' is given for the same purpose." *Pharmacographia Indica.*

550 Ficus religiosa, LINN. *Kan.* Arali mara, Ragi mara, Aswatha mara.

Fig.—*King. Fic. Pl. 67*; *Wight Ic. t. 1967. Bedd. Fl. Sylv. t. 314.*

References.—*Fl. of Brit. Ind.*; *Dict. of Econ. Prod. of Ind.*; *Pharm. Ind.*; *Brand. For. Fl.* *415.*

The sacred peepul of India. A lofty tree, 70 to 100 feet, with whitish bark and glabrous, shining leaves, attached to long flexible petioles. Being suspended somewhat in the manner of a flag, the leaf is easily moved by the slightest current of air, and the rustling sound proceeding from an isolated tree, often when there is no apparent wind, is not unlike the patter of falling rain. Indeed it is supposed that, the sound distinctly heard for a day or two, indicates the near approach of rain at a season when it is usually much needed. The leaves are deciduous in the beginning of April, but trees are seldom quite bare for more than ten days, and when timely rain falls, for less than a week. When it first appears, the young foliage is copper-coloured.

Leaves alternate, long petiolate, coriaceous, shining on the upper side, minutely tuberculate when dry, underneath, ovate-rotund, apex narrowed into a long slender acumen, base broad, rounded to truncate; average blade $4\frac{1}{4} \times 6\frac{1}{2}$ in. Fruit in sessile pairs, axillary, smooth, depressed-spheroidal or slightly 3-angled, the size of a black currant, purplish when ripe.

The species is held in great veneration by the Hindu people, who cherish it beyond all other trees, believing, as they do, that it embodies the sacred triad *Brahma*, *Vishnu*, and *Shiva*. Parts of the tree are used on the occasion of ceremonials, investitures, and domestic occurrences; vows are made to it and it is invoked for male issue and other supposed blessings. In the latter practice, it is not unusual to see pious women walking around the tree many times, muttering incantations the while. Pilgrims on the march take off their shoes on approaching a

tree and walk humbly around it from right to left praising the deities by which it is possessed. As the planting of a peepul tree is considered an act of grace, it follows that the species is abundant in all parts of the country, but especially in the vicinity of shrines, tanks, and villages, where devotees do congregate. The neem, another sacred tree, and the peepul are usually planted together, the operation being occasionally attended by all the ceremonies of an ordinary marriage. When a man is married more than once it becomes necessary that he should perform the ceremony in connection with the planting of the peepul and neem.

Wood of no value. Weight 30—45 lb. per cubic foot. A coarse fibre is obtained from the inner bark. Birdlime is prepared from the milk-sap, as also an inferior kind of caoutchouc. The medicinal value of the root-bark is highly spoken of, especially in its application to cases of gonorrhœa, asthma, and sterility. Sheep, goats, and cattle, browse fondly on the tender leaves, which are said to improve and increase the flow of milk. The peepul is much prized as a shade-tree for coffee but unfortunately it is not very abundant in the evergreen forest.

Cultivation.—When masticated and dropped by crows and other birds, the seeds germinate readily in the fissures of trees, clefts of rocks, on house tops, old walls, and in various out-of-the-way places, but sown by the gardener they rarely or never germinate. It is usual, therefore, to collect seedlings from the places noted above. Large limbs of the tree take root in moist ground, but unless a hot-bed is prepared it is difficult to raise plants from tender cuttings. Being of epiphytal origin, the peepul tree can sustain itself in the early stages of growth without much assistance from the soil.

Except that the surface roots are apt to become troublesome, it affords one of our finest avenue trees,

551 Ficus Tjakela, Burm. *Kan.* Seluvarada mara, Kap basuri?

Fig.—*King. Fic. Pl. 70.*

A tall glabrous tree without aerial roots. Not very common on the Mysore plateau, and mostly confined to the hills. Frequently seen in the Kankanhalli jungle.

Leaves long petiolate, coriaceous, glossy and shining on the upper surface, dark green, oval to ovate, acute, average blade 3 × 6 in. Fruit in clusters of 2—6 on very short tubercles, depressed globular, the size of a red currant, whitish yellow, dotted when ripe. Although closely allied to *F. infectoria*, Dr. King remarks that " this is a very distinct and beautiful species distinguishable from *infectoria*, by its minute receptacles in clusters of 4—6." Food is served upon the leaves, and the root-bark is medicinal, but with these exceptions the local uses of the species are unknown. Judging from its habitat in the hill forests the tree is evergreen, and the vernacular word *kap* has possibly reference to the dark-green tint of the foliage.

552 Ficus Tsiela, Roxb. *Kan.* Bili basuri.

Fig.—*King. Fic. Pl. 74; Wight Ic. t. 668.*

References.—*Fl. of Brit. Ind.; Dict. of Econ. Prod. of Ind.*

Common throughout the maidan, and at the sides of all the principal roads in Mysore; also ascending the hills to 4,000 feet. A large evergreen or sub-deciduous tree without aerial roots. Limbs often crooked or contorted; branchlets frequently fascicled so as to produce dense tufts of abnormally small leaves. These tufts are occasionally mistaken for the parasite *Badanike.*—Loranthus longiflorus—and are very characteristic of the species. Leaves long petiolate, coriaceous, glabrous, very variable in size and form, but mostly ovate lanceolate, with a

sharply acuminate apex; average blade 2×4 in. Fruit in sessile pairs, crowded at the ends of the branches, globose, smooth, purplish when ripe and the size of a black currant. The greenish-grey bark, glossy-green leaves and tufts of smaller leaves, render this a somewhat striking tree; and being a quick grower, having no aerial roots, and rarely quite bare of leaf, it is one of the best for roadside planting. Wood light, but comparatively tough, used for leaves and cart-axles &c.; when well dried, it affords fairly good fuel, and the inner bark gives a strong fibre. It appears to be a likely tree for the sustenance of the lac-insect. The fruit is much relished by birds and small vermin.

Cultivation.—The same as for the peepul tree. Seedlings grow into finer specimens than are ever obtained from cuttings, and the frequent use of the latter, because they are conveniently at hand, will account in some degree for the contorted limbs so often seen in roadside trees. Plant seedlings at 40 feet apart.

553 Ficus infectoria, Roxb. *Kan.* Kari basuri.

Fig.—*King. Fic. Pl. 75 to 79*; *Wight Ic. t. 665.*

References.—*Dict. of Econ. Prod. of Ind.*; *Brand. For. Fl. 414.*

A deciduous tree of medium height, but wide spreading and well provided with aerial roots. Leaves—in typical form—glabrous, membranous, on rather long slender petioles, oblong-ovate or ovate, apex shortly acuminate, edges subundulate; average blade 2×5 in. Fruit in sessile pairs, globular, whitish flushed with red, eventually black, dotted, the size of a black currant. In his admirable work on *Ficus*, Dr. King has reduced this most variable species to five typical forms, three of which are strictly Indian. But varying conditions of climate, elevation, and, more than all, the hygrometric

state of the air, are factors which render the species almost polymorphic in character.

Wood soft and useless. Weight about 35—40 lb. per cubic foot. The liber affords a fairly strong *nar*—fibre—and the outer bark is medicinal. Elephants are supposed to be fond of the leaves, and cattle eat them also when grass is not available. Mr. Graham Anderson speaks highly of the tree as a shade for coffee. The following are his words :—"This tree, with its long, dark green, glossy leaves, may be said to be one of the finest for shade purposes, in the forests of Mysore."

Cultivation.—Propagate from seed and cuttings, seedlings being preferred to obtain strong, shapely growth. In general detail, the treatment required is the same as for all the hardy figs.

554 Ficus pumila, Linn.

Fig.—*King. Fic. Pl. 158.*

A climbing shrub with shortly petiolate, ovate, to ovate-elliptic leaves of different sizes, and large pear-shaped fruit the size of a table fig. There is a good specimen in the show-nursery of Messrs. Munisami and Sons, the Bangalore florists,

555 Ficus asperrima, Roxb. *Kan.* Gargatti, Gerguttee, Khargas.

Fig.—*Wight Ic. t. 633,*

The sand paper tree. Not uncommon in the upper parts of the Malnad, but not indigenous to the maidan. A small or medium sized evergreen tree, with all the young parts, especially the leaves, very scabrous. Leaves crowded at the ends of the branches, ovate to obovate or elliptic, average blade $2\frac{1}{4} \times 5$ in., exceedingly rough, used for polishing wood and steel. Fruit pedunculate, scabrous-hisped, globular, the size of a small gooseberry, yellow or purple when ripe, with yellow spots. Wood soft and useless. Leaves commonly used in Shimoga

to polish sandalwood carvings. When incautiously handled, the milk-sap of this tree causes an uncomfortable irritation of the skin. The juice and bark are well known remedies in the treatment of enlarged liver and spleen.

"Large trees generally make a clearance of the coffee around them. The leaves are subject to the attacks of a black fungus which frequently spreads to the coffee below." *Graham Anderson.*

Cultivation as in the case of fig trees generally, but requiring a cool, damp situation.

556 Ficus hispida, LINN. *Kan.* Kadatti mara

Fig.—*King. Fic. Pl. 154 & 155; Wight Ic. t. 638, & 641.*

References.—*Dict. of Econ. Prod. of Ind.; Pharm. Ind.*

This is the *Kakodumbarika* or "crows' fig" of Sanskrit writers. A small evergreen tree, common on low hills and ascending to nearly 4,000 feet; often stunted or bushy in habit. Leaves opposite or alternate, shortly petiolate, ovate to oblong or elliptic, cuneate at the base, dentate when young, but entire or nearly so when fully grown, very variable in size and characteristically rough in all the younger parts;—hispid-pubescent,—average blade, under shade 4 × 11 in., under full exposure $2\frac{1}{2} \times 5$ in. Fruit usually hypogœal at first, then ascending the trunk and limbs progressively as the tree attains stature, borne in clusters or fascicles, shortly stalked, very hispid, globular to obovoid or slightly turbunate, the size of a gooseberry, yellowish. Species remarkably prolific of fruit, from which a clear liquid exudes copiously during growth. Given to milch-cows, this fruit possesses the property of arresting the flow of milk. Rheede says that the fruit boiled in goat's milk is usefully employed in the treatment of hepatic obstruction. It is also an emetic.

Dr. King figures two varieties of the species, one having opposite and the other alternate leaves. Cultivated in the Lal-Bagh. The wood appears to be soft and useless like the most of the fig trees. Cuttings are easily rooted, but seedlings are preferable for good growth.

557 Ficus Roxburghii, Wall.

Fig.—*King. Fic. Pl. 211 ; Wight Ic. t. 673.*

References.—*Brand. For. Fl. 422. Dict. of Econ. Prod. of India.*

A spreading evergreen tree of 20—30 feet in height, although the primary branches usually sweep the ground and give the species the appearance of a huge bush. Indigenous to Northern India, Chittagong and Burmah; but introduced from the Royal Botanic Gardens, Calcutta, and cultivated in the Lal-Bagh. This remarkable tree will soon spread in local cultivation, both for ornament and the popular use of its beautiful leaves in lieu of crockery. Leaves deeply cordate, ovate-rotund or nearly orbicular, copper-coloured when young, strongly ribbed underneath; average blade 10-12 in. The large, turbinate or truncate-pyriform fruit is borne in enormous clusters around the base of the trunk, and upwards as the tree advances in age and stature; twice the size of an ordinary table fig but insipid to the taste and quickly becoming hard and woody.

As a subject for scenic planting and domestic utility, this species will soon find favour in Mysore. It was first introduced in 1882.

Cultivation.—Cuttings take root in moist situations but seedlings have not been raised from the local trees. Perennial moisture is of more importance to healthy growth than even the quality of the soil, although the richer the latter is the better. Plant at 40 feet apart.

558 Ficus glomerata, Roxb. *Kan.* Atti.

Fig.—*King. Fic. Pl. 173 & 174*; *Wight Ic. t. 667*.

References.—*Fl. of Brit. Ind.*; *Dict. of Econ. Prod. of Ind.*; *Pharm. Ind.*

The country fig. A large buttressed tree of 50—70 feet. Never quite bare, although the leaves mostly fall at the close of the cold season. Bark whitish-grey; young parts pubescent, or slightly scabrous, subsequently glabrous and usually more or less tubercled. Leaves petiolate, membranous, alternate, ovate-oblong to oblong-lanceolate, tapering to a bluntish point; average blade $2\frac{3}{4} \times 5\frac{1}{2}$ in. Fruit pedunculate, clustered on the trunk and limbs, very prolific, subglobular to oval or subpyriform, the size of a plum, reddish when ripe and littering the ground under the trees.

Except for occasional use under water, the wood has no industrial value. Weight 25—30 lb. per cubic foot. Medicinal properties are attributed to the leaves, bark, fruit, and milk-sap, the latter being very commonly applied to bruises, ulcers, and other external sores. Although eaten by the poor in times of scarcity, and fairly palatable when half ripe, the raw fruit is not good for human consumption. At an early stage of maturity it becomes possessed of maggots, but donkeys, swine, goats and cattle, are fond of it, and if specially prepared at a certain stage of growth it would doubtless afford a good portable food for cattle in times of scarcity. In upper India the unripe fruit is pounded, mixed with flour, and made into cakes, while in this province there is a popular notion that the curried green-fruit is a good remedy for rheumatism. Being plentiful all over the maidan districts, the collection and preparation of half or partially ripened fruit into a portable food for cattle, is worthy of trial.

Of its merits as a shade tree for coffee, Mr. Graham Anderson gives the following account:—"It is generally allowed to be the very best shade tree for coffee estates and is consequently invariably preserved. It is easily propagated from seed and small cuttings. It is almost destitute of leaves in the monsoon, but, in the hot weather it is clothed in a rich, glistening foliage. It is admirably suited for coffee which flourishes under its cool and most desirable protection."

To the above remarks may be added the fact that it is a characteristic of *Atti*, and several other fig trees, to impart moisture to the soil in which their roots are placed, an important function which, no doubt, aids the growth of other plants when they are situated under the protection of such trees.

Cultivation.—Seedlings of this tree are usually abundant in the haunts of birds and in the clefts of other trees. Cuttings of all sizes root freely, and for permanent growth plant in a somewhat moist situation at 40 feet apart. Being a very dirty tree while in fruit, it should not be planted near the source of drinking water, nor in pleasure grounds where the main object is tidiness.

559 Ficus macrophylla, Desf.

The Moreton Bay fig. Introduced from Australia and cultivated in the Lal-Bagh from whence it is spreading to gardens and plantations in various parts of the province. A handsome evergreen tree with a few aerial roots. In the form, texture, and venation of leaf, this species might almost be mistaken for *F. elastica*, but the receptacle (fruit) is wholly different to the receptacle of the latter, being produced in axillary pedunculate pairs, ovoid, purplish with orange spots, the size of a gooseberry. "Diameter of trunk 36 to 76 inches; height 50—100

feet. A large and magnificent wide-spreading tree; yielding its milk-sap copiously for caoutchouc." *Hill.*

"Perhaps the grandest of Australian avenue trees, and among the very best to be planted, although in poor dry soils its growth is slow. Easily raised from seed." *Baron von Mueller.* Planted in a moist situation, this quickly becomes a grand tree.

Cultivation.—Local efforts to raise seedlings have so far been unsuccessful, but the species is easily multiplied from layers and cuttings. Recommended for avenues in moist situations, and for scenic planting generally. Plant at 45 feet apart.

560 Ficus Cunninghami, MIQ.

This is another Australian species cultivated in the Botanical Gardens. A splendid evergeen tree, rivalling the Java fig in spread and stature, although a little slower in growth. It bursts into young leaf and fruit early in April, or at the same time the *Honge* breaks into leaf. Leaves alternate, long-petiolate, thinly coriaceous, dark green, midrib and lateral veins ivory-white, ovate to ovate-elliptic, base full, apex rather abruptly pointed; average blade $2\frac{1}{2} \times 5\frac{1}{2}$ in., petiole $2\frac{1}{2}$ in. Receptacle in pairs, shortly pedunculate, crowded on the outer branches, globular, ivory-white with a tinge of green, the size of a gooseberry, attractive against the dark foliage. Except that the fruit might be a little troublesome when falling—not more so than in the case of *Goni*—this is a splended avenue tree.

Cultivation.--It attains its fullest development in deep moist soil. Seedlings come up spontaneously in various places, and cuttings are easily rooted on a hot bed. Plant in large square pits, but not very deep, at 50 feet apart.

561 Ficus Carica, LINN. *Kan.* Sime atti. *Hind.* **Anjur.**

Fig.—*Bot. Plates Lal-Bagh Collection.*

References.—*Dict. of Econ. Prod. of Ind.*; *Pharm. Ind.*

The edible fig. Cultivated in Indian gardens and said to have been introduced during the Muhammadan conquests of Central and Southern India. Indigenous to Persia, Arabia, Turkey, and countries forming the southern part of the Mediterranean basin. It is a tree of great antiquity, being frequently mentioned in the ancient literature of Palestine, Greece, and Rome. There are several varieties in local cultivation, and the nutritive properties of the fruit are generally acknowledged by the people.

Cultivation.—In this country, the fig tree is most productive when grown within walled enclosures and in the backyards of dwellings where there is practically no wind. But to this should be added proper irrigation, good drainage, and a rather copious supply of mixed manures. The root growth should also be limited to a given area, otherwise the tree is apt to run to leaf and wood almost exclusively.

Seedlings are often difficult to raise, although the species is readily propagated by the various methods of division, such as grafting, inarching, layering, and the insertion of cuttings. Plant at 10 feet apart.

Several undetermined species of *Ficus* will have to be included in a future edition of this work. Of these, the vernacular names *Kalatti*, and ***Seluvara***, are suggestive of rather common trees, which are found at intervals throughout the deciduous and mixed zones. The first named is a large umbrella-shaped tree usually found among rocks. Leaves oblong, rather small and densely covered on the under side by a tawny tomentum. Fruit small, round and sessile. The Flora of British India enumerates 112 species of this grand genus.

562 **Antiaris toxicaria,** LESCHEN. *Kan.* Jajhugri, Jaguri, Ajjanapatte.

Fig.—*Bedd. Fl. Sylv. t. 307. Wight Ic. t. 1958.*

References.—*Fl. of Brit. Ind.*; *Dict. of Econ. Prod. of Ind.*; *Brand. For. Fl. 427*; *Pharm. Ind.*

The upas and sack tree. Common in the Western Ghâts from Bombay to Cape Comorin. Of arborescent species this is stated by Beddome to be the largest in the above region. It is a magnificent evergreen tree attaining a maximum height of 250 feet. Leaves alternate, bifarious, very shortly petiolate, oblong or elliptic-oblong, acuminate, tomentose or pubescent when young, eventually scabrid or glabrous; average blade $2 \times 5\frac{1}{2}$ in. Flowers unisexual—*monœcious*—unattractive. Fruit like a small fig, pear-shaped, velvetty, purplish, and very bitter; seed poisonous. The poisonous principle *antiarin*, of which so much nonsense has been written by the Dutch Surgeon, Foersch, is obtained in Java and the Malay Islands, from the green bark and leaves of the tree. The hill-men of Coorg, Wynaad and Travancore, remove cylinders of bark from sized logs of the tree and utilise them as grain sacks. The simple process of manufacturing the latter is well described in the following paragraph by Graham:—"A branch is cut corresponding to the length and diameter of the sack wanted, soaked a little, and then beaten with clubs till the fibre separates from the wood. This done, the sack formed of the bark is turned inside out, and pulled down until the wood is sawn off, with the exception of a small piece left to form the bottom of the sack, which is carefully left untouched."

These sacks are commonly displayed in Museums as remarkable products of the vegetable kingdom, but in Travancore, Canara, and other hill districts,

they are in common use to carry rice and similar articles of export. The liber, or inner bark, affords this dense fibrous layer which nature has woven into a coarse fabric for the instruction of man. But although coarse in the natural fabric, the fibre is really soft and durable and could be utilised for ropes, matting, and similar articles. The wood is said to be coarse-grained and unserviceable. Being a tree of the moist evergreen forests, any attempt to grow it on the plains would, in all probability, meet with failure.

563 **Artocarpus hirsuta,** LAMK. *Kan.* Hebhalasu, Heb halsu, Kad halasu, Hesswa, Hessan.

Fig.—*Bedd. Fl. Sylv. t. 308. Wight Ic. t. 1957.*

References.—*Dict. of Econ. Prod. of Ind.; Gamb. Man. Timb.; Brand. For. Fl. 426.*

The wild jack-tree. Abundant in Western Mysore, Coorg, and the Baba Budan range where it ascends to 4,000 feet, and attains an individual height of nearly 200 ft. This lofty evergreen tree is well known to the planters, who prize it as a shade for coffee. Leaves alternate, petiolate, broadly ovate-elliptic or obovate, subacute, young parts strigose ; average blade 6 × 9 in. Fruit erect, covered with spines, the size of a large lemon. A reserved timber tree of the local evergreen forest. Wood hard and durable when well seasoned, yellowish brown, close-grained and highly prized for boat-building, in which it stands next to teak in value. But it is also used for house-building, furniture, and agricultural implements. Weight 35—40 lb. per cubic foot.

"A stately evergreen tree, which affords good shade and produces a large quantity of leaf mould annually. The shoots from stumps—coppice—should never be encouraged or depended upon as they are easily blown down and generally get cankered or

die off about the tenth or fifteenth year. A *Hessan* in poor or shallow soil generally causes the coffee to suffer all around its stem, but in a deep soil this does not appear to occur. The timber of mature trees is excellent and durable, and is much prized for building purposes. No reliance should be placed on poles or beams made from immature trees or from the shoots arising from stumps, as these will be readily attacked by dry-rot and by a large species of borer—carpenter bee?—or will quickly decay if exposed to damp. A young *Hessan* resents heavy lopping by showing early signs of canker." *Graham Anderson.*

The fruit is not eaten in Mysore, although Watt states that the pulp is much relished by the natives. This grand tree is easily propagated from seed, but it is unsuited for cultivation on the plains.

564 Artocarpus incisa, Linn.

Fig.—*Bot. Mag. t. 2869—2871.*

References.—*Dict. of Econ. Prod. of Ind.*
Proceedings of the Agri-Hort. Ic. of Madras.

The bread fruit tree. Two varieties of this handsome evergreen species are cultivated in the Botanical Gardens. One called the seedless bread fruit, having no seed, is much esteemed by the Pacific Islanders, and has recently been established here on trial. It has also borne fruit and is likely to succeed under careful management. But in an inland situation like Bangalore, we cannot expect great results from these maritime trees. With careful treatment, especially in the matters of irrigation, and top-dressing with saline manures, fairly good specimens are produced; but it is doubtful if the fruit will ever become popular, while it is quite certain never to replace any of the indigenous food products which are commonly consumed by the Mysore people.

Being very ornamental, the species should find a place in irrigated pleasure grounds. The seeding variety, which is equally effective for scenic purposes, is easily propagated from seed.

565 **Artocarpus integrifolia,** LINN. *Kan.* Halasu, Halsu, Hulsen, Halasina mara.

Fig.—*Bot. Mag. t. 2833. Wight Ic. t. 678.*

References—*Bedd. For. Man. Dict. of Econ. Prod. of Ind.; Gamb. Man. Timb. 329.*

The jack-fruit tree. Wild in parts of the Malnad. Elsewhere extensively cultivated for its fine fruit of which there are many varieties differing in form, colour, size, and taste. A handsome evergreen tree with dark-green foliage; usually 45—60 feet in height but much loftier in the wild state. Leaves alternate, petiolate, ovate-oblong to elliptic-oblong, glabrous, acuminate, entire; average blade $3\frac{1}{2} \times 7$ in.

Stipules spathaceous and very large. Fruit enormous, suspended from the trunk and main limbs by short, stout peduncles, hypogeous in very old trees, oblong to clavate, with a thick and densely muricated rind. Maximum size 30 inches long by 12 in. in diameter, more usually half the above size. Maximum weight of a single fruit 60 lbs. The edible part of the jack-fruit consists of the yellow, fleshy pericarp of the achenium, of which there are 30 to 90 in each receptacle—fruit—according to size, position, and kind. When less than half grown and quite tender, the whole fruit is sliced up and curried. The roasted seeds are also much consumed by the hill tribes; but they are indigestible to Europeans and are rarely used in lieu of chesnuts. In his useful compilation of "Forest Trees in the Coffee Lands of South Mysore," Mr. Graham Anderson describes two varieties under the verna-

cular names of *Billaru* and *Buckay*. The first-named, which possibly corresponds to the wild form, is dense and rapid of growth, but bearing a worthless fruit and easily injured by the wind, the branches often breaking by their own weight. It is also stated that although even-grained and easily worked, the wood of this variety is apt to split. The *Buckay*, on the other hand, although slower of growth, is superior in the production of fruit, timber, and as a shade for coffee. The jack tree dislikes and resents much lopping. Laden from the trunk and main limbs with full sized fruit, it is a grand object worthy of the highest admiration. It has also a growing reputation as a timber tree, although not yet included in the forest reserve of that class. Sapwood white, heartwood yellow when newly exposed, but eventually changing to reddish-brown or light mahogany; close-grained, easily worked and taking a good polish, but requiring matured growth and careful seasoning to prevent warping or splitting. Used in Mysore for boat-building, planking, furniture, and dyeing. Said to be imported into England for cabinet and fancy work. Weight 43—45 lb. per cubic foot. A sticky milk-sap copiously produced from all the herbaceous parts of the tree, is utilised to some extent in the preparation of birdlime; heated over the fire, it becomes a good cement for domestic use. In the maidan districts, the jack tree is exclusively cultivated for its popular fruit. The fruits growing on the root-stock are highly prized as a rule.

Cultivation.—This tree is easily propagated from seed, the latter being placed in a pit containing prepared soil where the seedling is intended to grow permanently. Transplanting should be avoided, as seedlings having broken or twisted tap-roots never succeed well, and the main root attains length so rapidly after germination that the operation of re-

moval either from seed-beds or pots is fraught with considerable risk. All this is avoided, therefore, by carefully planting one or more seeds in the position where the tree is required. In some parts of the country, it is not unusual to plant in a single pit a whole fruit containing 50 or more seeds, the best seedling of the lot being subsequently left to form the tree. The species requires a deep moist soil, and seldom acquires any size, or much utility, when the soil is dry and shallow. When tiles, baskets, or flower pots are employed to raise seedlings in, the bottoms should be removed at an early stage of growth so that the tap-root may not be twisted.

566 Artocarpus Lakoocha, Roxb. *Kan.* Vonte mara.

Fig.—*Wight Ic. t. 681.*

References.—*Brand. For. Fl. 426*; *Dict. of Econ. Prod. of Ind.*

In the Malnad, this attains to a large tree. *Dahu* and *Lakoocha* are its Sanskrit names.

Leaves deciduous, shortly-petiolate, oval to oblong-elliptic, full and round at the base, slightly pubescent underneath, especially when young, upper side dark green, glabrous and shining; average blade 5×9 in. Fruit roundish or irregular in form, velvetty, the size of a tomato, yellow when ripe, not known to be eaten in the south of India. Wood used in the north for furniture and canoes. In Bengal, the juice of the tree—milk-sap—or a seed, is a common purge. Two specimens may be seen in the Daria Dowlet Bagh, at Seringapatam, where they fruit freely every year. "Mr. Mann says the bark is chewed in Assam as a substitute for betelnut."
Dict. of Econ. Prod. of Ind.

Cultivation.—Although doing fairly well in the garden at Seringapatam, the species is stunted com-

pared to the fine growth of the Malnad. Seeds germinate freely, and propagation can also be effected by layering the branches.

567 Artocarpus Cannoni. It is not known where this species comes from. But one or two small plants purchased from Mr. Bull's nursery, in 1887, have developed into nice saplings. Of these, the one growing in the enclosure where the animals are mostly kept, is well advanced. Leaves copper-coloured, much smaller than the leaves of the bread fruit tree, and not so deeply incised. In point of colour, this is an acquisition to the local collection of ornamental trees. The purple to yellowish fruit, resembles a miniature fig. Propagation is effected by layering the side branches, inserting cuttings in a hot-bed, and possibly by sowing seed. Plant at 30 feet apart.

568 Bœhmeria nivea, HOOK.

The Rhea fibre shrub. This industrial plant is propagated in the Lal-Bagh and has been established on the hills by the European planters. It grows vigorously in Mysore and Coorg, and is reproductive from offsets. If occasion should ever require it, many thousands of offsets could be produced at short notice. The indigenous species *B. malabarica*, Wedd. and *B. platyphylla*, Don. are commonly found on the hills, where they provide *nar*—fibre—of excellent quality.

569 Villebrunea integrifolia, GAUD.

A small evergreen tree of the Western Ghâts. Specimens are required for herbaria, with vernacular names and information bearing on the local uses of the tree.

570 Debregeasia velutina, GAND. *Kan.* Kapsi.

Fig.—*Wight Ic. t. 1969; Bedd. For. Man. 226. t. 26. f. 5.*

References.—*Dict. of Econ. Prod. of Ind.*; *Fl. of Brit. Ind.*

This large shrub is frequently found in the uplands of Mysore, and in the sholas leading into the mixed and evergreen tracts. With ashy-white leaves (underneath) and dense clusters of orange-yellow berries on the young stems, the *Kapsi* is a familiar object to the sportsman and planter. The inner bark affords a strong, clean fibre, which is used by the hill-men to make strings for their bows. But the quality of the fibre is such that it merits a much wider utility than the above mentioned, and will, no doubt, take a more prominent position, with other latent products of the country, when the natural supply is brought within reach of the market. With a more penetrating railway system, the merits of these alpine products will receive closer attention than is possible at present.

571 Castilloa elastica, Cerv.

The Ule, or Central American rubber tree. This important species is under trial in the Botanical Gardens, but it will probably succeed better on the hills of the province, as Burma, Assam, Ceylon and the lower slopes of the Nilgiris, are supposed to be suitable regions for its cultivation. A few European planters are cultivating on a small scale, both in Mysore and Coorg.

LXVII. CASUARINEÆ.

572 Casuarina equisetifolia, Forst. *Kan.* Kesarike.

Fig.—*Bot. Plates Lal-Bagh Collection*, *Bedd. For. Man. t. 226.*

References.—*Dict. of Econ. Prod. of Ind.*; *Gamb. Man. Timb. 346*; *Pharm. Ind.*

The "swamp oak" of Queensland, but better known in this country and elsewhere as the "Tini-

an pine" or "beef-wood tree." It is a pretty evergreen tree of rapid growth, with thin, feathery foliage and conical habit. Diameter at base of trunk 12—24 inches; height 50—70 feet. To those who frequent the groves of the Tinian pine, the mournful soughing of its fluted branchlets is a familiar sound. The proper leaves are reduced to mere scales at the tips of the branchlets. Flowers monœcious, inconspicuous and dull red. Fruit stalked, cone-like, muricated, oval, and about an inch long. As a fuel tree, this exotic species bids fair to surpass all others, and is already extensively cultivated in Southern India, where numerous plantations are formed and millions of seedlings put down annually. In the vicinity of Bangalore, and especially along the Madras sea-coast, these plantations have visibly altered the landscape within the past decade. The tree has the reputation of drying land exhaustively, and this is in some measure confirmed by the fact that it succeeds best in sandy or porous soils where the subsoil is always moist. It is, on this account, an excellent subject for planting on the sea-shore and on lands that are being reclaimed from the sea. Full directions as to planting, care-taking, and departmental procedure in the treatment of *Casuarina*, will be found in the annexed memorandum, which has recently been published by Mr. L. Ricketts, Inspector General of Forests in Mysore.

MEMORANDUM ON CASUARINA PLANTING IN MYSORE.

"*Distribution and Use.—Casuarina equisetifolia*, Forst, is scattered through Queensland, North Australia, the Malay Archipelago, Fiji, the sea-shores of Chittagong, Burma, and Siam; but it is probably naturalized in many of these places, as it soon will be in several parts of India.

It is the beefwood of Australia, and, in this country, it has already (within the present century) inherited some vernacular names. But the local or Kanarese name 'Kesarike' is a mere corruption of the generic name, *Casuarina*. The

species is abundant in many of the Islands of Malay and Fijian Archipelagos, where it appears to be truly indigenous.

In India, the tree is extensively cultivated, but although many square miles are covered with matured trees bearing fertile seeds, the species has not been observed to be self-productive in the matter of throwing up seedlings, nor does it coppice well. Notwithstanding these drawbacks, Casuarina planting has largely developed in Mysore owing to its regular and rapid growth, and ready sale for firewood. For domestic consumption, the fuel is highly prized, and that it develops more heat in a given quantity than any other kinds of local fuel, has been practically demonstrated by the officials of the Mysore State Railway. In these experiments conducted by Mr. Molloy, it was reckoned that Casuarina logs ran a train over a distance 13 per cent in excess of that attained by the next best kind of fuel available in the Mysore forests. When using Casuarina for domestic purposes, the people endeavour to subdue its intense heat by adding fuel of inferior power.

If this is not done, they find that their utensils wear out very rapidly. The same result has happened where Casuarina is exclusively used in locomotives, and it is a question how far its calorific properties should be moderated by the intermixture of other fuel substances.

Beefwood (so called from a fancied resemblance in color) is coarse grained, and seasons somewhat badly. It weighs from 55 to 62 lb. per cubic foot, but cracks and splits under weight or exposure to the weather. The bark is astringent, and the burnt ashes afford material for making soap. As a timber, it is not of much value being subject to the attacks of white ants.

2. *Soil.*—The soil need not be rich, but such, as would retain moisture for a lengthened dry period, is most conducive to the rapid and robust growth of the Casuarina. This means, necessarily, a deep soil having a retentive clay bottom. The surface soil should be light and sandy, and in situations where the water-level is always within a few feet (8 to 10) of the surface, the latter answers best. This is confirmed by the rapid growth of plantations on the sand dunes of the Madras coast. The deep loamy soils of Mysore, incorporated in many places with varying quantities of oxide of iron, are not unfavorable to the growth of Casuarina.

3. *Pitting.*—Many of the facts recorded in this Memo occur in Mr. Hutchin's paper on 'Sandal' published in Indian Forrester of 1884, where the writer incidentally touches upon Casuarina planting, upon the details and advantages of yard cube pits and of tile-pot nurseries, and upon transplanting;

vide pages 254 to 261. Further details may, with advantage' be taken from the same article. The pits for Casuarina must be truly a cubic yard of 27 cubic feet, *i. e.*, a square yard at the top, bottom, and on each side. The advantage of the yard-cube size of pit is, that the cooly can get into it and dig it out large and square at the bottom, where it is most important for root development. The pits should be lined and spaced with a rope so that the lines intersect in simple squares; they should be dug at 12 feet apart each way, if Casuarina alone is planted, and at 9 feet where its rows alternate with sandal. Another plan is to plant at 6 feet apart with the intention of subsequently removing every alternate sapling when it has attained 4—5 years' growth. By this arrangement, the young trees are better sheltered from the wind, being so much closer, while a considerable return on the initial outlay may be expected from the sale of such saplings.

4. But as pits are dug as labor offers, and when the ground is favorable for pitting, it is often, and properly, the case to have a large balance of pits on hand. The pits so dug should be left fully exposed to the action of the weather. The cold damp soil in the bottom of the pit will be enriched by exposure to the sun's rays and other atmospheric influences, which will also be at work on the heaps of loose earth lying around the pits. Before pitting, the land should be thoroughly cleared of scrub growth.

5. *Formation of Ground Nursery.*—The Hebbe system of raising seedlings differs from that of the pot-tile in that seedlings are raised and reared in the nursery-bed until such time as they are fit for direct removal to the field or plantation. When large enough, these seedlings are carefully lifted with balls of soil adhering to their roots and are replanted into pits for permanent cultivation. This mode of treatment, however carefully performed, is liable to injure the young roots, and growth is checked at a time, *viz.*, in the rainy season, when the seedlings should make a good start. As a rule, therefore, except when the cost of pot-tiles is prohibitive, the Hebbe system of nursery should never be adopted.

In cold and temperate countries, where the root development of seedling trees is not so active, the operation of transplanting direct from nursery-bed to plantation is not so difficult. But in the tropics, seedlings of six inches in surface height will often have a descending axis of one foot. The site selected for a nursery, of whatever class, should be near to a permanent supply of water. The ground should be trenched in December, thoroughly cleared of all roots, and finely dressed for sowing operations in January, February, and March. By extending the sowings over a period of three months, the vegetative powers of various species can be regulated so that the

quick growing kinds may not be too large for potting when the monsoon sets in. The nursery plots should be laid out on the native method for irrigation, as nothing can beat the latter whether for efficiency or economy. But greater care is necessary than the native gardener usually exercises in watering seed-beds, as many valuable seeds are easily rotted when the soil about them is always wet and cold. But the latter condition will rarely occur if the soil is porous, and otherwise well placed in regard to position and drainage. Very little manure is required, and it should never be fresh or crude. Burnt soil is useful, and the burning of combustible rubbish over the trenched site has the additional effect of killing weeds and insect life with their seeds and ova. The contact with fire cures also the raw, soapy condition of the subsoil, and renders the inert plant-food soluble and assimilable.

6. A few words about the collection of Casuarina seeds may be added. The trees do not all of them come into bearing at the same time. Some bear fruit as early as May or June, and others progressively until October and November, while matured trees yield two crops of fruit yearly at the above dates.

The best time for sowing is in the month succeeding each harvest, or say, in August and January. The fruit is ripe for gathering when it attains an orange yellow tinge, and begins to drop from the base of the cluster.

When whole clusters are gathered, the unripe fruits near the apex should be discarded. The remainder is then daily exposed to the sun on date or other mats. After three days' exposure, the ripened fruit will have shed the whole of its seed, which latter should be sifted and bottled, or placed in covered chatties, if not required for immediate sowing. The fruit receptacles may be burnt over the nursery plots, as they contain potash and other manurial ingredients.

In the harvesting season, the daily collection of fruit should be exposed and treated independently, and the date of storage in any vessel should be marked upon the latter. To carry out this routine, three to four separate mats must be in use, the fourth one is to provide against rainy weather. Casuarina seeds are greedily devoured by ants, sparrows, rats, and other vermin, care should therefore be taken to preserve them from these pests.

The seed should be rather thickly sown in small square beds, (pategalu) the surface of which has been levelled and slightly pressed down. They are then covered by a thin layer of sifted soil, and the bed is thoroughly watered by means of a water pot and fine rose. If any seeds appear on the surface after this watering, they should be slightly pressed down, and an additional covering of sifted soil may be dusted over the exposed and uneven parts. After sowing and watering, cover

the beds over with a layer of leaves or twigs to retard the direct effects of solar heat and prevent rapid evaporation. The best plant for this purpose is the 'Bandare', *Dodonæa viscosa*, as its leaves do not rot nor separate readily from the stem.

A protective covering of this kind also protects the seeds to some extent from the ravages of insects and vermin. To prevent the seed being washed into the corner of the bed, as would be the case with ordinary irrigation, the surface should be gently and evenly watered through the rose of a watering pot. The germs appear on the surface within 8—10 days, and the seedlings will be an inch high within the month. In three months they should be 4 inches high, which is a nice size for potting into tile-pots. The latter operation can be safely performed, however, until the seedlings are 4 to 5 months old. The preservation of the tap-root is always an important matter. Weeding is not effected in Casuarina seed-beds, as the seedlings grow very closely together and any attempt at weeding would uproot the latter.

8. *Formation of Tile Nursery.*—Meanwhile tile-pot beds are formed and kept ready to receive the seedlings as recommended in the foregoing paragraph. "The tile-pot is formed by placing two semi-cylindrical country tiles together edge to edge, so as to form a cylinder, about 5 inches in diameter and 10 inches long. The cylinders are placed together side by side in previously excavated beds, till they form a honey comb filling the whole up flush with the surface of the ground. To facilitate counting, each bed usually contains 100 tile-pots, 10 rows of the latter having 10 in the row. The beds of tile-pots are separated only by narrow paths, just wide enough to permit the formation of the channels by means of which the beds are irrigated" (*Mr. Hutchins in the Indian Forester for June* 1884). The soil ought not to be hard below the pot-tiles, for it will prevent perculation of water, which, in consequence, would stagnate and render the plants sickly. Roots may be prevented from penetrating the soil below the tile-pots by a layer of pot-sherds being placed under the latter. This allows the water to drain off while it effectually confines the roots of the young Casuarina to the cylinders in which they are preserved.

9. *Transplanting into Pot-tiles.*—In March, when the seedlings in the ground nursery will have grown some 4—6 inches high, such of them as are healthy and vigorous will be pricked out into the pot-tiles previously prepared for their reception by a slight watering. The evening is the best time for transplanting, and on the following morning some light shading, such as twigs of the "Bandare," should be laid over the transplants. If this is not done, a number of the seedlings are sure to succumb under the fierce rays of a March sun. These

tile-plants should be watered daily, and when their roots have laid hold of the soil, shading should be entirely removed. Details of weeding, stirring up the surface soil, and replacing casualties, will require constant attention, and as the plants attain size, they will absorb more water. The number of healthy plants which the Department expects to secure in tiles, for field planting, is 90 per cent of the number pricked off, and subsequently cultivated in pot-tiles, 10 per cent being foregone in favor of Mestris, in consideration of the amount of care necessary for free germination in sand beds and healthy growth in pot-tiles. If at the final counting, or planting, it be found that failures exceed 10 per cent, the value of such excess should be recovered by short payment.

10. About the month of April, the seedlings are subject to the attacks of crickets and grass hoppers, but seedlings that have tender or herbaceous stems are alone affected by these pests. It is therefore necessary to plant out hardy seedlings with slightly woody stems, or to prick off early in February, and push growth so that the young plants may be sturdy enough so resist the ravages of voracious insects. Although the latter exist at an earlier season, it is only when herbaceous vegetation is universally withered up that they commit havoc in nurseries, &c., and from April till the advent of good rain, it is necessary to employ coolies (small boys) to drive off the insects, otherwise the percentage of failures would be high. In some localities, and in certain seasons, these pests are absent, but as a rule, they should be expected and coped with at the lime, and under the conditions indicated in this paper.

11. Manuring the nursery is an essential point, and a word about it will not be out of place. Thoroughly pulverised farm-yard manure is good for general application, but in special cases, oil cakes, sheep dung, and ashes, are highly beneficial. The last named affords material for the early formation of woody fibre, and is therefore of exceptional value in giving stability to the young plants. In all cases, the manure should be applied sparingly as the object is not to induce a lanky herbaceous growth. Liberal manuring makes the seedlings too tender for their future life in the field.

12. *Transplanting into Pits.*—This will be done during the S. W. monsoon, commencing as soon as the ground has been nicely cooled by copious rain. August is perhaps the best month for general planting, providing that the monsoon is normal. A few days, not later than a fortnight, previous to transplanting, the pits should be refilled to the ground level with the earth formerly removed from them. In filling pits, it is essential that all the loose earth should be returned so as to form a small mound above the ground level, as earth dug out and weathered occupies about 25 per cent more space than it

does in its undisturbed condition underground. This process should not be undertaken when the soil is wet. Working a wet soil, with plough or spade, renders it hard in drying and destroys its porosity. The filling is best done after a good shower of rain, and when the soil is sufficiently dry to be powdery, but moist. In other words when it is nicely workable with the spade or mamoti. But in certain experimental cases, the Casuarina will thrive when the pits had been filled up in anticipation of rain. By the planting season the seedlings in the pot nursery will have attained a height of $1\frac{1}{2}$ to 2 feet, and the pot-tiles will then be lifted and carried in baskets to the field. Here the cylinders will be carefully separated into their two halves, so that the soil about the roots of the young tree may remain intact. The plants themselves will then be carefully put into the prepared pits, the earth around them being slightly pressed by the feet of the planter while he holds the seedlings in an erect and natural position. A thorough watering should be given directly the plants are put down and, unless the weather is showery, a few succeeding waterings at intervals of two to three days will be of much benefit to the plants. Ponds and hollows about the plantation are furnished with water at this time, and, should the rains hold off, the transplants could be watered occasionally at reasonable cost and much more than proportionate benefit. In certain private plantations, where four waterings were given, the percentage of failures was very materially reduced and the plantations made good progress. When the planting is completed, the halved tile-pots may be returned to the nursery for storage, or to be refilled as in the first instance. By using pots, the root growth of the seedling is restrained, while little or no shock is received in transplanting into the field, and the established seedlings are in a position to lay vigorous hold of the soil at a favorable season.

13. *Replacing failures.*—It has here to be noted that the first thing, to be done, under this head, is to replace the previous year's failures as ascertained by final counting at the close of the dry season. The rate for the above will be minus the cost of filling in the pits.

14. *How payment is made.*—Tho number of healthy and vigorous plants, which the Department expects to secure at the final enumeration, is 90 per cent of the total number put into the ground. In order to secure this, 25 to 30 per cent of the cost that becomes payable to Mestris should be withheld till the results of final countings are known, and if the failures exceed 10 per cent, the value of such excess should be deducted from the amount held in arrears, or if necessary from any other amounts due to the Mestris for work done. But the filling in of pits is not paid for independently of

transplanting; for which the rate fixed includes the cost of (*a*) taking out plants from the nursery, (*b*) taking back tile-pots to the nursery, (*c*) filling in of pits, (*d*) transplanting and (*e*) watering the plants put out, if necessary.

15. *Weeding.*—Weeds should be removed immediately around the young trees once or twice a year, so that the growth of the latter may not be choked. The surface soil might be advantageously stirred up at the same time. This weeding should be continued for two or three years, when the young trees will have grown to a size sufficient to create a shade which will either suppress or kill the weeds. In addition to keeping weeds and grass down immediately around the trees, it is necessary to keep the whole field clear of extraneous growth, except grass, for a few years, or until the Casuarina suppresses under scrub by the density of its own growth.

16. *Pruning.*—In the 3rd or 4th year, the lower branches of the trees should be carefully sawn off to admit light and facilitate a free passage of air.

This operation should be attended to with the greatest care, and is on no account to be entrusted to ignorant or unskillful subordinates. In fact it had better be left undone, than be done badly or roughly.

17. *Trenching and hedging.*—A trench 3′ × 3′ will be dug all around the plantation, and on the earth ridged on the outer bank, aloes (*Agave americana*) will be planted to form a protective fence against fire, cattle, and interlopers. Where the common aloe is not procurable, 'Papas Kattali' and 'Bonte Kalli' afford good material for fences.

18. *Working plan and plan of operations.*—No plantation, unless it is a very small one which can be finished in a year, should be opened without a working plan. The advantage of having such is, that regular working is ensured and a complete check exercised. Unless a plan is made and adhered to from the beginning, irregularities will be sure to creep in sooner or later. Confused work on the field is certain to be followed by confusion in the accounts; good work cannot be detected from the bad, and after a few years it becomes impossible to say what expenditure has been profitable, or the reverse. An annual plan of operations for each plantation will be prepared by the Forest Officer and issued to the Ranger for guidance and execution.

About 20 acres is a convenient size for a plantation compartment, while a line 11 yards in width, and cleared of all vegetable growth, should separate the compartments to protect the plantation from fire.

19. *How work is done and paid for.*—All work in plantations is to be done on the contract system through Mestris

who, in lieu of fixed pay, will be allowed 5 to 7 per cent commission on the value of work turned out with Government money and tools, and 10 per cent when they work with their own capital and tools.

Each Mestri is to be furnished with an estimate showing the different works to be done and the sanctioned rates for the same. Once a month, or when there is not sufficient progress, once in two months, the Ranger should check, measure up the work turned out by each Mestri, and enter the same on the right side of his pass sheet, the work or works to be done in the following month, in pursuance of the plan of operations, being entered on the left side of the same sheet. This pass sheet will be submitted, in duplicate, to the Forest Officer, who shall check both sides of the pass sheet with the aid of his note book, and issue a cheque for such amount as may be passed by him in settlement of the Mestri's account.

The cheque should be drawn in favor of the Mestri concerned and no other, and his acknowledgment obtained. One of the pass sheets will be returned to the Ranger for revising his original copy, if necessary, and handing back to the Mestri concerned.

20. *Inspection by Forest Officer.*—The chief work being inspection and timely correction of all mistakes in the various stages of plantation work, it is necessary for the Officer in charge of Plantations to be constantly moving about and checking the work on the field.

21. When a completion report of any kind of work, especially pitting, planting or clearing, is received from the Ranger, the Forest Officer should make a personal inspection and satisfy himself that the work is efficiently done and that no gap has been left in the details. It will not be considered an excuse for bad or fraudulent work that the Mestri is at fault, or that the Ranger has been careless in supervision. The Forest Officer alone will be held responsible for every operation in the nursery and in the field, and notably in the seedlings under his charge being healthy and vigorous.

22. Any prolonged stay at Head-quarters will be taken as proof that the Forest Officer is indifferent to the work and unmindful of the interests of Government, and in fact of his own reputation also, as no one can know better than he does how work is apt to degenerate, and be scamped, if not frequently and closely scrutinised.

Rates.—The prevailing rates at the Government plantations for different items of work are set forth in the annexed statement.

Statement of working rates prevailing in Government Plantations from 1st October 1891.

No.	Particulars of Work.	Revised Rates.				Remarks.
		Per.	Rs.	A.	P.	
	Boundary and Protection.					
1	Digging boundary trench	18 cubic yards.				From Jannary to June } In the Malur, and Kolar Ranges.
		22 "	1	0	0	From July to December } In the Malur, and Kolar Ranges.
		14 "				From January to June } In the Bangalore, Gubbi and Kadur Ranges.
		18 "				From July to December } In the Bangalore, Gubbi and Kadur Ranges.
2	Planting Aloe hedge ...	200 to 300 running yards.	1	0	0	
3	Cutting fire line, (5 yards wide) ...	Mile.	5	0	0	
4	Annual clearing of do ...	"	3	0	0	
	Seeds.					
	Collecting sandal	32 to 40 seers.	1	0	0	
	Do Casuarina	10 "	1	0	0	
	Nursery.					
6	Digging or sinking well, ...	6 to 8 cubic yards.	1	0	0	
7	Preparing soil and forming beds	40 beds.	1	0	0	

8	Sowing seeds or planting seedlings ...	40 beds.	1	0	0	
9	Watering seedlings	,,	1	0	0	
10	Tiles delivered at nursery site	1,000	5 to 7	0 0	0 0	
11	Do setting	1,000	1	0	0	
12	Sowing seeds or planting seedlings in tiles ...	1,000	0	4	0	
13	Watering seedlings in tiles	1,000	0	4	0	
	Pitting.					
14	Clearing jungle	Acre.	0 to 2	8 0	0 0	
15	Digging pits one yard each way	* 20 pits.	1	0	0	From January to June } In the Malur and Kolar Ranges.
		* 24 ,,				From July to December } In the Malur and Kolar Ranges.
		* 16 ,,				From January to June } In the Bangalore, Gubbi and Kadur Ranges.
		* 20 ,,				From July to December } In the Bangalore, Gubbi and Kadur Ranges.
16	Digging pits one foot each way	400	1	0	0	(N. B.—Should the S.W. Monsoon begin early enough, the month of June may be treated as wet weather. But no diminution in size of pits is to be allowed.)
17	Do two feet do	140	1	0	0	
18	Do 1 yard long, 1 yard broad, 1 foot deep.	210	1	0	0	

No.	Particulars of Work.	Revised Rates.				Remarks.
		Per.	Rs.	A.	P.	
	Transplanting.					
19	Putting out in pits (new)	1,000 plants.	* 6	0	0	Out of Rs. 16 allowed for transplanting, Rs. 7¼ will be paid immediately after transplanting and the balance upon final counting of survivals after the 1st dry weather.
20	Do (old)	1,000 ,,	* 3	0	0	
21	Carrying 1,000 plants from nursery site ...	Mile.	* 2	0	0	
22	Watering transplants...	1,000	* 5	0	0	
		Total......	16	0	0	
	N. B.—This charge is allowed on the understanding that the transplants will be watered on alternate days for a week or ten days after planting in view to enable the transplant to strike root and establish itself during the dry season, when needed					
	Improvement.					
23	Pruning plants	400 to 2,000	1	0	0	

* Denotes revised rates.

L. RICKETTS,

Inspector-General of Forests and Plantations.

LXVIII. SALICINEÆ.

572 Salix tetrasperma, Roxb. *Kan.* Niravanji, Niranji.
Fig.—*Bedd. Fl. Sylv ; t. 302. Wight. Ic. t. 1954.*
References.—*Brand. For. Fl. 462 ; Dict. of Econ. Prod. of Ind. ; Fl. of Brit. Ind.*

The South Indian willow tree. Much planted on the banks of rivers, streams, and nallahs, where it attains to a height of 20—40 feet, and acts as a good barrier to the wear and tear of running water. Leaves deciduous, alternate, petiolate, stipulate, narrowly, or somewhat broadly, ovate-lanceolate; average blade 5×1 in. Flowers appearing in advance of, or simultaneously with, the young leaves, in slender yellow catkins. For planting in moist land, this is one of the most suitable trees. Often planted at the roadsides where there are tanks and wet cultivation. Sapwood abundant, whitish; heart wood small, dark-brown, weighing 35—40 lb. per cubic foot. When procurable in size, which is the chief difficulty, the heartwood is admirably adapted for cabinet and fancy work. The whole tree is much prized as an efficient source of fuel, and is rather largely used in some parts for the manufacture of gunpowder charcoal. Baskets and wicker work are made from the supple shoots and branches. The green foliage is browsed upon by cattle, and trees are often badly pollarded on that account.

573 Salix babylonica, Linn.

The weeping-willow tree. This introduced species is occasionally found in gardens, and there are three old trees on the bund of the Shoolay Tank, at Bangalore. Well suited for ornamental planting near water, and on lawns that are favourably situated in regard to irrigation in the dry season.

Cultivation.—The presence of moisture is a *sine qua non* in the successful cultivation of willow trees, and in this country, the last named species will only

do well in comparatively cool altitudes. The best situation of all is in sandy or soft alluvial soil on the banks of a running stream. Cuttings of all sizes root freely in moist sand. It is a mistake to plant the indigenous species as a roadside tree in dry localities, and the practice is only justified where the land is too wet for other trees of denser foliage and larger growth.

LXIX. CONIFERÆ.

574 Cupressus torulosa, DON.

An evergreen tree cultivated in the Lal-Bagh, and occasionally in private gardens also, for ornament. Indigenous to the Western Himalaya where it attains a height of 150 feet, with a trunk girth of 17 feet. The maximum height attained at Bangalore is under 50 feet. Local growth is thus stunted, while the production of timber is very limited.

575 Cupressus Funebris, ENDL.

The Chinese weeping cypress. Cultivated in the Botanical Gardens, where the species thrives indifferently. Branches horizontal, branchlets weeping. Planted near temples and monasteries in Nepal, Sikkim, Bhutan, and Northern China. Maximum height 60 feet. *C. lusitanica*, Mill, the Goa cypress, and *C. macrocarpa*, Hartweg, are introduced evergreen trees, cultivated in Indian gardens.

576 Cupressus sempervirens, LINN.

The columnar or upright cypress of Indian gardens and cemeteries. Originally introduced from Europe or the North-west of India. Although cultivated solely for scenic effect, in local gardens, the wood of this tree is known to be exceedingly durable, and is much prized in Eastern Europe for making trunks and other domestic articles. Local trees have not seeded, but they are readily propagated by the process called 'Chinese grafting.'

577 Podocarpus latifolia, WALL.

A small evergreen tree of the South-Western Peninsula. Cultivated in the Lal-Bagh.

578 Dammara robusta, C. MOORE.

The Queensland Kauri pine. Introduced from Australia and cultivated in the Botanical Gardens. Of this splendid evergreen tree, Mr. Walter Hill writes as follows :—" Diameter of trunk 36 to 72 in; height 80 to 130 feet. This huge tree inhabits the alluvial banks on the rivers near the coast in the Wide Bay district; also in the moist and sheltered valleys on Frazer's Island. It has a smooth-barked trunk, of a red colour; the branches are produced in whorls of 5 to 10, distant, spreading, and of a large size. The wood is fine grained, free of knots and easily worked. It is, however, not a plentiful tree. At the present time—1880—the sawyers are receiving 7*s.* 6*d.* for 100 superficial feet. Some trees yield as much as 25,000 feet."

579 Dammara Australis, LAMBERT.

The Kauri pine of New Zealand. Cultivated in the Botanical gardens and growing well. " This magnificent tree measures, under favorable circumstances, 180 feet in height and 17 feet in diameter of stem; the estimated age of such a tree being 700 or 800 years." *Baron von Mueller.* The timber afforded by these two species of *Dammara* is remarkable for its uniformity of grain, exemption from knots, and size of plank. The kauri resin of New Zealand is a curious product which the Maoris gather mostly from the sites of extinct kauri forests. Cones are produced on the Bangalore trees, and a few self-sown seedlings have recently been discovered in flower pots standing adjacent to one tree; this is very encouraging as all hand sowings of the seed produced from this tree had failed entirely, and it was thought that the seed was sterile. A deep soil containing plenty of

moisture has proved favourable to vigorous growth The finest tree in the collection has attained the height of 67 feet.

580 Frenela Gunnii, ENDL.

The Tasmanian pine, and *F. columellaris*, F. Muell, are effective evergreen trees. Cultivated in the Lal-Bagh, but too delicate for forest planting.

581 Araucaria Cookii, R. BR.

The Caledonian pine. In local cultivation, this handsome conifer has a peculiar habit of enclining towards the east or south east. But in places where the trees are sheltered from the full force of the South West monsoon, the growth is erect or nearly so. Cones are produced on two aged trees in the Botanical Gardens, and the seeds contained in these are beginning to germinate. The species forms extensive forests in New Caledonia, where single specimens attain the height of 200 feet. Much prized for ornamental effect in gardens and pleasure grounds, and for Christmas trees, where the species is produced in quantity.

Cultivation.—Planted in deep loam, with a liberal top-dressing of leaf mould, seedlings soon lay hold of the moist subsoil and become independent of irrigation. Plants raised from layers never form a leader, and are therefore useless for the production of trees. To form a grove or avenue, sturdy seedlings of a foot and upwards in height should be selected, planting at 30 feet apart during showery weather.

582 Araucaria Bidwillii, HOOK.

Introduced from Queensland and cultivated in the Lal Bagh. Known in Australia as the *Bunya Bunya*. This grand conifer has thriven well in local cultivation, growth being erect and symmetrical in almost every specimen. The two finest trees in Bangalore will be found, one on either side of the band-

stand, in the Lal Bagh. These trees have attained a height of 80 feet, and are about 32 years of age. A few cones are occasionally produced on one of the trees, but the seeds contained in them appear to be imperfect. For fuller information relating to this important species, the reader is referred to the following paragraph by Mr. Walter Hill of Brisbane:—

"A noble tree, inhabiting the scrubs in the district between Brisbane and the Burnett Rivers. In the 20th parallel, it grows thickly over a portion of country, in extent about 30 miles long and by 12 broad. The tree has a very singular appearance, the trunk is quite straight; its bark is thick and smooth; the branches are produced in whorls of six, seven or eight; they are horizontal, inflexed, and ascending at the extremities. From the style of growth, singular foliage, and peculiar fresh colour, when surrounded with other trees of a different habit and greyish tint, it produces a fine effect, from the striking contrast presented by its rigid growth, and fresh green lance-shaped leaves. The wood is not only very strong and good, but it is full of beautiful veins, and capable of being polished and worked with the greatest facility. The cones produced on the extreme upper branches, with their apex downwards, are large, measuring 9 to 12 inches in length, and 10 inches in diameter; on coming to maturity they rapidly shed their seeds, which are 2 to 2½ inches long by 1 inch broad, sweet before being perfectly ripe, and after that resemble roasted chestnuts in taste. In accordance with regulations issued by the Government, the tree is not allowed to be cut down by those who are licensed to fall timber on the Crown lands, the fruit being used as food by the aboriginals. The trees produce some cones every year, but the principal harvest happens only every three years, when the

blacks assemble from all quarters to feast on it. The food seems to have a fattening effect upon them, and they eat large quantities of it, after roasting it at a fire. Contrary to their usual habits, they sometimes store up the Bunya nuts, hiding them in a water-hole for a month or two. Here they germinate, and become offensive in taste to a white man's palate, but are considered by the blacks to have then acquired an improved flavour. The taste of the Bunya when fresh has been described as something between a chestnut and a raw potato."

Cultivation.—The same as for *A. Cookii*. But as the tree attains a greater diameter than the latter it should be planted at 45 feet apart. Only strong seedlings of 18 inches and upwards should be used for planting out in the field.

583 Araucaria excelsa, R. Br.

The Norfolk Island pine. This magnificent tree, which has recently been introduced for trial, attains a maximum height of 220 feet, with trunk 10 feet in diameter. Like the other species of the genus, it is conical in form, rigidly symmetrical, and evergreen. The timber has been used in Australia for ship-building. Propagate from seed, and plant out finally at 40 feet apart.

584 Araucaria Cunninghamii, Ait.

The Moreton Bay pine. Although, as will be seen further on, this is the most ornamental and useful tree in Queensland, it is by no means the best species for this part of India. In local cultivation it shoots up too rapidly and becomes, in most specimens, a mere chandelabral spindle, the internodes between the upper whorls of branches being sometimes 16 feet in length. This overdrawn growth is unsatisfactory, and causes the local tree to possess a weird or fantastic appearance which is quite unnatural to the species. The tree

is also much infested by scale—*Coccus adonidum.*—If planted on the uplands of Kadur and Shimoga (not in the interior of the forest) the Moreton Bay pine would attain better growth. In cultivation, it requires the same general treatment as the other species of the genus. "Diameter, 36—60 inches; height 150 to 200 feet. This majestic tree is, without exception, the most ornamental and useful tree in Queensland. Its beautiful regular pyramidal form, and the sombre green of its awl-shaped foliage command general admiration. It covers immense tracts of land along the coast, and in the interior. It overtops all other trees; whether growing on the alluvial banks near rivers, or upon the steep and rugged mountains in the interior. Its branches are produced in whorls from six to eight in number, horizontally and spreading. The bark is thick and brownish. The timber is an article of great commercial importance, and is used extensively in this colony. The wood is strong and durable when kept dry, but soon decays when exposed to alternate damp and dryness. When produced from the mountains in the interior, it is fine-grained and is susceptible of a high polish, which excels that of satin wood or birds-eye maple. The resin which exudes from the trunk is very remarkable; it has all the transparency and whiteness of crystal; and that portion of it which adheres to the trees, hangs from them in the shape of icicles, which are sometimes 3 feet long and 6 to 12 inches broad. The sawyers receive at the present time 6*s.* 6*d.* to 7*s.* per hundred superficial feet, some trees yielding as much as 10,000 feet of saleable timber." *Walter Hill.*

Araucaria Cunninghamii var glauca is a variety with silvery foliage recently introduced for trial.

585 Thuja orientalis, Linn.

The Arbor Vitæ. A small evergreen tree of local gardens. Introduced from China, but seldom attaining to more than a shrub in Mysore. The evergreen branches are popularly used for Christmas decorations. Succeeds well in the cooler climate of Ootacamund.

LXX. CYCADACEÆ.

586 Cycas circinalis, LINN. *Kan.* Goddu ichalu.

This small tree, with its naked trunk and terminal crown of long, pinnate, shining, coriaceous leaves, is often mistaken for a palm or tree fern. But being a well marked *Gymnosperm*, it bears no relationship to these trees. The species is plentiful in the Malabar district, where it mostly affects the low or intermediate hills situated between the Ghâts and the sea, and where a useful flour is prepared from the nuts of the tree. It is less abundant in this province, and does not appear to enter into the domestic economy of the people. The local vernacular name is somewhat misleading, as *Ichalu* is the proper name for the Mysore toddy palm, a species which bears no affinity to the genus *Cycas*.

LXXI. SCITAMINEÆ.

587 Musa superba, ROXB. *Kan.* Kadu bali, Betta bali.

Fig.—*Wight Ic. t. 2017. Bot. Mag. t. 3849—3850.*

References.—*Fl. of Brit. Ind.; Dict. of Econ. Prod. of India.*

The hill plantain. An herbaceous or soft-wooded tree of 12 to 15 feet. Indigenous to parts of the Malnad, and occasionally cultivated for ornament; symmetry of form and great beauty of leaf being marked characteristics of the species. Leaves

stoutly sheathed at the base and giving the short trunk almost a bulbous appearance, 8—10 feet in length by 2 in breadth, seldom splitting except in age, cuneate and often reddish at the base. The plant dies after seeding, and it does not throw out offsets. A somewhat coarse fibre is afforded by the stem and petiole. "Dr. Dymock has recently found a sweet, translucent, jelly-like manna exuding from the plant, which, when dried at a low temperature, yielded 82·3 per. cent. of fermentable sugar." (*Hooper, Chem. Notes on Mannas, 1891.)*

The fruit of the wild plantain is not edible, but it matures seed from which the species is readily multiplied.

588 Musa sapientum, LINN. *Kan.* Bale.

References.—*Fl. of Brit. Ind.*; *Dict. of Econ. Prod. of Ind.*; *Drury U. Pl.*

The banana tree. There are many varieties of this useful species, which have been cultivated in Indian gardens from pre-historic time. But like the plantain tree, the banana is essentially domesticated, and soon becomes extinct if wholly left to its own resources. It follows the haunts of men, and occupies a place in nearly every locality where there is irrigable land and density of population. Patches of cultivation adjoin every important village in the low country, adding a verdant beauty to the scene which is distinctly tropical in its effect. The several varieties of banana furnish the table fruit, which is consumed in the raw state; but under special preparation they also afford banana meal and are made into cakes and puddings. Enormous quantities of fruit are consumed in Indian cities, where the market value is higher than in the country, but the supply is always equal to the demand and even the poorest classes are able to secure a share of this nutritious fruit. In addition to

being cheap, the banana possesses the great advantage over most other fruits of being available all the year round. One or two varieties of the species are exclusively cultivated for their soft flexible leaves, which are popularly used by the better classes to serve food upon, in lieu of dishes. *Musa sapientum* var. *Paradisiaca* affords the plantain, which differs from the banana in being larger, coarser, and unsuited for eating in the raw state. The stem of the plantain tree is green, while the bracts are purple on the inner face. The banana, on the other hand, has a purple-spotted stem and its bracts are green-coloured on the inner face. The plantain, or cooking variety, is not so abundant in this province as it is on the plains of India, where the preparation of the fruit is better understood.

The following varieties of banana and plantain are commonly met with in local cultivation.

Kan—Yelakki bale.	... Large fruited banana.
" "	... Small do. of same.
Yele bale.	... Cultivated for the leaves only.
Gulur bale.	... Large butter banana.
" "	... Small. " "
Katte bale.	... Cooking plantain.
Madranga bale.	...
Rasa bale.	... Dessert banana.
Havu bale.	... Snake banana.
Gujja bale.	... Short banana.
Putta bale.	... Small, elegant banana.
Chandra bale.	... Red banana.
Jain bale.	... Honey banana.
Raja bale.	... Royal banana.
Pacha bale.	... Green banana.

Cultivation.—Seed is rarely produced by the domesticated forms of this variable species; but propagation is readily effected by the division of offsets, which are freely produced around the parent stem. To obtain the finest crops of fruit, the banana requires frequent irrigation and liberal treatment in the application of plant food. Alluvial silt, reddish

loam, and black cotton soil are equally suitable as a ground-work for this cultivation, but in each case should be added a good proportion of farmyard manure, with occasional top-dressings of oil-cake, bone-dust, night soil, and liquid manure. Plant at intervals of two months so as to keep up a succession of fruit.

589 Musa textilis, Nee. In Cav.

The Manilla hemp tree. Cultivated in Botanical Gardens. Mr. J. G. Baker includes it in the Flora of British India as a variety or subspecies of *M. sapientum*. In general appearance, it closely resembles the latter, although the fruit is worthless. It is the *Abaca* of the Phillippines.

"The Abaca is cut when about one year and a half old, just before its flowering or frutification is likely to appear, as afterwards the fibres are said to be weaker. If cut earlier, the fibres are said to be shorter and finer. It is cut near its roots, and the leaves cut off just below their expansion. It is then slit open longitudinally, and the central peduncle separated from the sheathing layers of fibres, which are in fact the petioles of the leaves. Of these layers the outer are harder and stronger, and form the kind of fibre called *bandala*, which is employed in the fabrication of cordage. The inner layers consist of finer fibres and yield what is called *lupis*, and are used for weaving the *nipis* and other more delicate fibres; while the intermediate layers are converted into what is called *tupoz*, of which are made web-cloths and gauzes, four yards long, of different degrees of fineness. These are universally used as clothing: some being so fine that a garment may be enclosed in the hollow of a hand." *Royle.*

The ornamental species *M. ensete*, from Abyssinia, and *M. sumatrana*, are usually cultivated in the Botanical Gardens.

590 Ravenala madagascariensis, SONNER.

The traveller's tree. Introduced from Madagascar and cultivated in a few local gardens for ornament, or as a curiosity.

LXXII. PALMACEÆ.

591 Areca Catechu, LINN. *Kan.* Adike.

References—*Pharm. Ind; Dict. of Econ. Prod. of Ind.; Fl. of Brit. Ind.*

The Areca-nut or betel-nut palm. An evergreen tree having a tall, slender, annulate trunk of uniform thickness, surmounted by a small crown of pinnate leaves 4—6 ft. in length. In favourable situations, the simple trunk attains to a height of nearly 100 feet without a bend, but in less suitable localities the average height is 50—70 feet. Areca-nut gardens are a profitable source of income both to the cultivator and the State, the latter deriving a large revenue from a *halut* or custom duty levied upon the nut. The finest betel-nut gardens are situated on the confines of the Malnad, where there is rich soil and plenty of water. Places that are specially noted for the excellence of their nuts are Birur, Nagar, Periyapatna Chiknayakanhalli, Madgiri, and Channapatna. In cultivation, the tree is often associated with the cocoa-nut palm, although exclusive plantations are numerous and admittedly the most profitable in the Malnad. As a masticatory, with lime and the betel-leaf, the demand for Areca-nut is practically unlimited in the east. The consumption is enormous, and India is said to require 30,500,000 pounds of the nut annually in addition to her own produce, which is very great. In Mysore, there are two distinct varieties of the species, one producing large and the other small fruits. There are also numerous preparations of the nuts for ceremonial, and marketable purposes.

Cultivation.—The betel-nut palm is propagated readily from seed, which is planted in rows in half-filled trenches of sand under shade. When firmly placed in position, the ripe nuts are covered over to the depth of 4—5 inches with a compost of sand and black soil in equal parts; the trench is then well saturated with water every third or fourth day during the dry season, and until the seedlings are well sprouted, but the latter should not be removed to the plantation until they are properly rooted and at least a foot in height. The partial shade which is necessary in the early stages of cultivation, is usually provided by an associated crop of bananas planted a month or two in advance of the Areca-nuts, and intermediately with the pits prepared for the latter. It is also customary to continue the cultivation of bananas or plantains with the object of intercepting radiation and maintaining a cool, moist surface for the benefit of the main crop. A fertile black soil containing calcareous nodules near the surface, is prized for this cultivation, but it is a *sine qua non* that the water level should not be many feet below the surface, and where such is the case, alluvial silt, and ordinary loam are equally productive soils. It is necessary during the rainy season to drain off superfluous water by means of open ditches placed at intervals between the rows of trees, for although the Areca requires a perennial supply of moisture at no great depth in the subsoil, it is keenly susceptible of being water-logged. In the Malnad, it is usual to plant two seedlings in one pit, the weaker of the pair being subsequently removed when there is little risk of failure on the part of the reserved specimen. In topes exclusively apportioned to the Areca-nut, the planting is mostly too close; 1,200 to 1,500 trees being allotted to the acre, exclusive of the banana trees. The results would in all probability prove more advantageous

in the end if the trees were allowed greater space, or say 6—7 feet between the pits. A full grown tree is calculated to produce 250 to 300 nuts annually. The Mysore product is highly valued at Bombay, where it realises Rs. 80—100 per candy of $5\frac{1}{4}$ cwt.

592 **Areca alba,** Rumph. **A rubra,** Bory., and a few other exotic species are cultivated in the Botanical Gardens.

593 **Arenga saccharifera,** Labill.

The sago palm of Malacca, and the Malaya also known as the sugar palm. Cultivated in the Botanical Gardens, where it only succeeds under the shade of other trees.

594 **Caryota urens,** Linn. *Kan.* Bagani, Byree.
Fig.—*Bot. Pl. Lal-Bagh Collection.*
References.—*Dict. of Econ. Prod. of Ind.*; *Fl. of Brit. Ind.*

The bastard sago or hill toddy-palm. Abundant in the warmer parts of the Malnad, but seldom found in the maidan, except in gardens. A handsome species attaining in good situations to nearly 50 feet. Trunk solitary, stout, annulate, clothed by a few bipinnate leaves of enormous size and great beauty. The immense spadix bearing a huge cluster of long drooping branchlets of flowers or fruit, as the case may be, is a marked feature of the species. While the flowers are still in bud, these pendulous clusters are conspicuous objects for several weeks, and are greatly prized for decoration on the occasion of native weddings. A very strong but somewhat coarse fibre is afforded by the large sheathing petiole of the leaf, while the cord-like fibro-vascular bundles at the base of the leaf sheath furnishes the material known as *Kittul* fibre, which in Ceylon and elsewhere, enters largely into the

manufacture of ropes, brushes, brooms, and baskets, &c. In bringing this product to notice, Dr. Watt very naturally wishes to know if some effort could not be made to develope the latent fibre industries of India. That the country possesses enormous material of this class goes without saying. When young and middle-aged, the *Bagani* abounds in palm wine or a sweetish sap which is palatable to the taste when newly drawn, but it soon ferments, when it is converted into arrack or jaggery. The finest toddy is obtained from the buds of the infloresscence during the hot weather. But as the tree ages, the flow of sap diminishes, and a pithy or farinaceous substance is formed in the old trunk which, on preparation, affords a kind of sago. In regions where the tree is abundant, the natives are said to utilise this food-product to a very large extent, but it does not appear to be so used in Mysore. "Outer wood fibrous, very dense, reddish-brown or black. Used for plough-shafts, rafters, reepers, wall-slabs, water-conduits, tank-pipes and rice-pounders. Being conical, the base of the tree is ingeniously fashioned into rice-measures, also into a species of drum called *Toodama*, which when operated upon with two leather thongs, creates a most deafening noise." *Graham Anderson.*

"A large tree prized chiefly on account of the sweet sap or toddy which it yields in abundance. The fibre obtained from the peduncle (petiole?) is made into rope and fishing lines. The tree (trunk) is also used for conveying water." *Lovery.*

Cultivation.—The seeds of this tree germinate very freely after an occupation of nearly three months. Steeping for a few hours in tepid or camphorated water would no doubt accelerate germination as the outer coating of the seed is naturally very hard. In virgin forest, alluvial, and made-up

garden soils, the *Bagani* succeeds well and becomes a fine decorative tree in 4—5 years. But it affects the moist regions of the hills where the annual rainfall ranges from 100 to 200 inches, and in the maidan part of the province systematic irrigation is needed to produce the best results. In its natural haunts, the tree is self-productive.

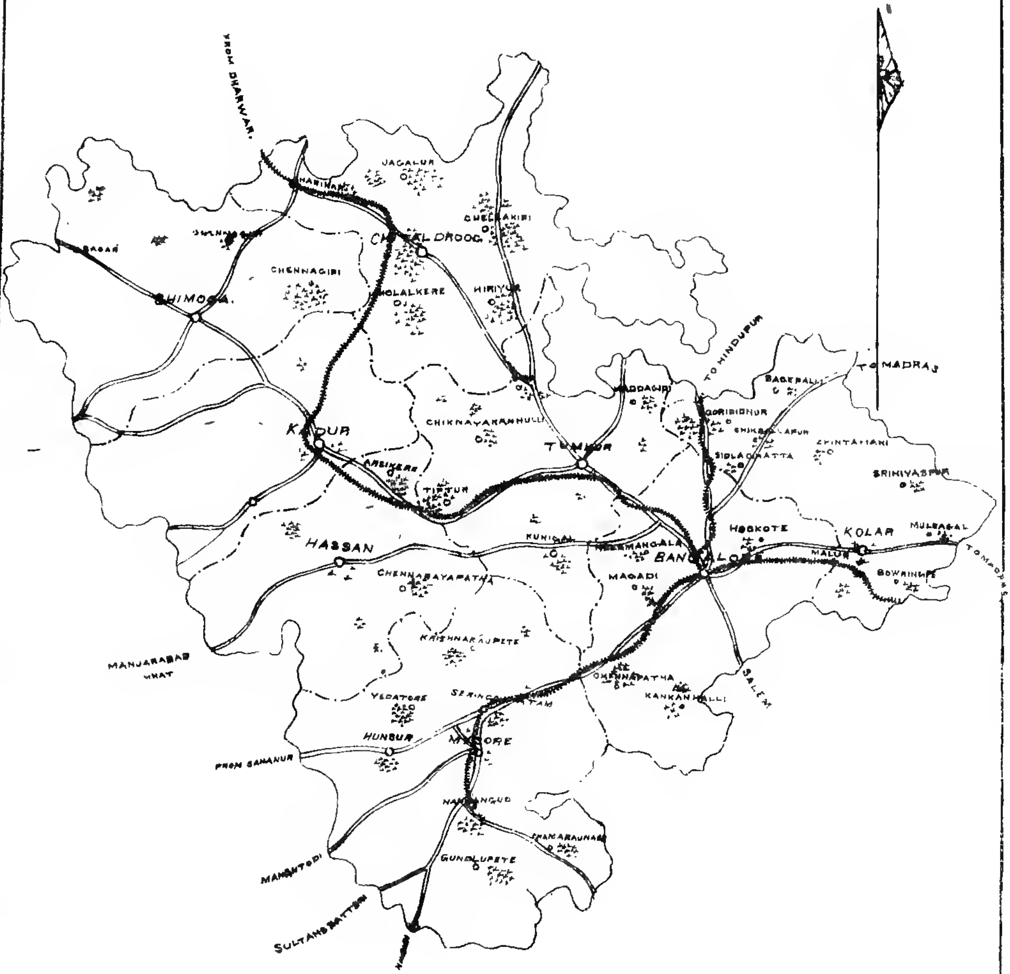
595 Phœnix sylvestris, Roxb. *Kan.* Ichal, Ichalu mara.

Fig.—*Bot. Pl. Lal-Bagh Collection.*

References.—*Dict. of Econ. Prod. of Ind.*; *Brand. For. Fl. 554. Fl. of Brit. Ind.*

This indigenous tree is locally known as the "Mysore toddy-palm," but universally as the "wild date," and "date-sugar palm." In full grown specimens, the solitary trunk is 30—40 feet, surmounted by a dense crown—in one or two tiers—of arched, pinnate, glabrous leaves, 10—15 feet in length. The stout bases of the petioles (leafstalks) being persistent and occasionally spinous, the trunk presents rather a formidable appearance. The toddy palm is not stoloniferous, but self-sown seedlings are so near to each other at times that they appear to proceed from a common root-stock. Flowers diœcious. Spadices erect and interfoliar, curved outwards and downwards in fruit. Male spadix 2—3 ft., female spadix longer, stouter, and usually changing to a reddish tint. In both sexes, the straw-coloured flowers are at first enveloped in a stout basilar spathe. The male flowers are the most conspicuous, during the short time they last. Fruit orange-yellow, or ultimately with a slightly reddish tinge, $1\frac{1}{4}$ in. terete, in ample clusters; eaten occasionally by children and beggars. Groves of this useful palm are distributed at intervals throughout the maidan, or flat portion of the province, where they occupy extensive areas of the best dry

Map showing the approximate distribution of the Mysore Toddy Palm, *Phœnix sylvestris.*



Scale 30 Miles to an Inch.

land in valleys, ravines and level plains; the total area thus occupied being roughly computed at 30,000 acres. (See Revenue and Agricultural Department's Statistics of sugar plants and sugar in 1888.) The finest groves are found in the Districts of Chitaldroog and Mysore, where the trees often attain a large size. But the pernicious practice of tapping very young trees and allowing the sap to run too long from older ones, is highly inimical to healthy development, and may account to some extent for the stunted growth which is observable in some of the plantations. The tapping season should be strictly confined to the months of December, January, and February, when the fall in temperature facilitates the flow of sap. The tendency to commence operations earlier and to pursue them later than the above period will, it should be remembered, have a corresponding tendency to exhaust the trees. In travelling through the toddy groves at this season, a great number of chatties or earthen vessels will be seen suspended to the trees at varying heights from the ground, but always immediately under the crown of leaves or between the two crowns, as the case may be, and where a triangular incision is made (mostly in a space cleared among the lower leaves) for the flow of sap. The revenue authorities are responsible for the farming out of the groves to competent contractors, but the process of tapping is systematically pursued by an experienced class of workmen called *Idigas* or toddy drawers, who operate upon the trees in cycles of seven or more at a time. Toddy, that is the crude sap in a sweet or slightly fermented condition, is largely consumed in the villages; while a much smaller proportion is boiled down with the object of manufacturing jaggery and date sugar. Under the existing rules, arrack is not distilled from the fermented juice, although this industry is

pursued in the adjoining districts of S. Canara, Krishna, and Cochin. The leaves of the tree are plaited into useful mats, and the spadix of the female flower, cut at a certain stage of growth, forms a good chunam brush.

Cultivation.—It is an axiom in this province that the presence of *Ichalu* in a healthy condition is a sure indication of good land, and as a matter of fact the species has never been known to succeed on bad land. A good depth of alluvial silt on a porous subsoil, is generally looked upon as the best medium for the successful cultivation of this industrial palm. The species is reproductive from seed, and the latter germinate freely under artificial treatment also. In forming groves, plant at 12—15 feet apart.

596 Phœnix dactylifera, Linn. *Kan.* Kurjoora, Kharjura.

References.—*Brand. For. Fl. 552. Dict. of Econ. Prod. of Ind.*

The Arabian date palm. A number of superior varieties and several bags of seeds were imported from the Persian Gulf districts in 1885. Subsequent cultivation at the Lal-Bagh and a few provincial centres proved fairly satisfactory; but the experience thus gained points to the probability that Mysore is too far removed from the date zone to offer special facilities for more than an ornamental growth of this useful palm. The trees in the Botanical Gardens have grown fairly well, and have been productive of offsets, but none of them have flowered. The species is established in North-West India, Sind, and is under cultivation at Saharanpur, Lucknow, Hyderabad, and other important centres. Under the most favourable conditions of growth, the date palm is a magnificent tree of 100 feet and upwards. It differs from the wild date tree in throwing out numerous offsets.

597 Phœnix rupicola, T. ANDERS.

A small but very elegant palm of Northern India. Cultivated in the Lal-Bagh.

598 Phœnix farinifera, ROXB. *Kan.* Sanna ichalu.

References.—*Fl. of Brit. Ind.; Dict. of Econ. Prod. of Ind.*

This almost stemless species is gregarious in many parts of the province, especially towards the hills where it occupies large areas of *Karab* land and replaces the toddy palm. Leaves prickly. Fruit shining-black when ripe. The short stem or root-stock contains a farinacious pith which was fully described by Roxburgh, and is utilised in some parts of India for food. The product seems to be unknown in Mysore. The leaves are occasionally used to thatch huts, and they afford excellent fuel for potteries.

599 Corypha australis, R. BR. Australian fan-palm.

600 Licuala spinosa, WURMB.

601 Livistona Mauritiana, WALL. Mauritius fan-palm.

602 Elæis guineensis, JACQ. African oil-palm.

603 Oreodoxa Regia, WILLD. Royal palm of Cuba.

604 Rhapis flabelliformis, LINN. Ground rattan.

The above named are exotic palms of which fine specimens will be seen in the Botanical Gardens at Bangalore.

605 Borassus flabellifer, LINN. *Kan.* Tale.

References.—*Dict. of Econ. Prod. of Ind.; Brand. For. Fl. 544.*

The palmyra tree of the plains of India, Burma, and Ceylon. It is a very characteristic feature of the eastern Tamil country, where groves and lines of trees are seen at intervals nearly all over the plains; and so important is it to the people that a Tamil poem is said to enumerate 800 uses to which

the various parts of the tree are put. But except in a few localities in the warmer districts the tree is seldom met with in Mysore nor does it attain its normal size and utility above the Eastern Ghàts.

Trunk 60—70 feet, often swollen in the middle and carrying a rather small crown of rigidly-coriaceous, fan-shaped leaves of variable size. In fine specimens the leaves are 8—10 feet in diameter, but usually much smaller when the tree is yielding economic products in quantity. The more prominent of the latter consist of gum, fibre, saccharine juice—convertible into vinegar, toddy, spirituous liquor, sugar, and medicinal products--fruit, seed, and timber. The palmyra palm requires tropical heat, and is reproductive from seed.

606 **Cocos nucifera,** LINN. *Kan.* Tengu, Tengina mara.

References.—*Dict. of Econ. Prod. of Ind.*; *Pharm. Ind.*; *Fl. of Brit. Ind.*

The cocoa-nut palm. This valuable tree attains greatest perfection near the sea-shores of tropical countries, while in an insular position like that of Mysore, the cultivation is neither so extensive nor so productive as it usually is in maritime situations. There are, however, certain localities in the province where the extensive cultivation of the tree is a long established and highly profitable industry, the best known being Gubbi, Chiknayakanhalli, Honnali, and Turuvekere in the Tumkur District; Barmasagar, Davangere, Budihal and Mattod in Chitaldroog, Harnhalli Taluk in Hassan, and Channapatna in the Bangalore District. Under the best cultivation, the tree begins to fruit in the sixth or seventh year, and on its attaining mature growth will yield 80—100 nuts annually. In Mysore, the tree is almost exclusively grown for its fruit, of which there are four established varieties described by Mr. Rice as follows :—

"1st red; 2nd red mixd with green; 3rd light green; and 4th dark green. These varieties are permanent, but although the red is reckoned somewhat better than the others, they are commonly sold promiscuously. Their produce is nearly the same." Some additional varieties have recently been introduced from Ceylon and constitute part of a new plantation which is being formed in the Palace Gardens at Bangalore. Good local topes are also found in the private gardens of Sir K. Sheshadri Iyer, and Mr. C. Meenachshaiya. Young trees are much infested by the rhinoceros beetle—*Oryctes rhinoceros*—a flying insect that settles on the palm during the night, and bores large holes through the unopened crown, or what is usually called the cabbage formation of the young palm. Careful hand-picking is the surest remedy for this pest, which is most destructive in young plantations, during the dry season.

Cultivation.—Although the cocoa-nut palm is known to succeed best in a sandy soil near the sea, yet it is widely cultivated in many insular parts of India, up to an altitude of at least 3,000 feet. Deep garden land of a sandy nature, having perennial moisture at a few feet below the surface, answers fairly well, but much depends on the temperature and the amount of moisture contained in the air. When entirely removed from the influence of the sea-air, the tree requires additional care and is usually much improved by an occasional top-dressing of salt and other saline manures. Seedlings are easily raised in nurseries, where the ripe nuts are treated on the same principle as the betel-nut and palmyra. When 15 inches high, they should be transplanted into the field at 20 feet apart, although in rich black soil, the tree attains large proportions and is said to be most productive when planted at

25 or even 30 feet apart. On the Madras coast the trees usually stand at 10—15 feet from each other.

LXXIII. GRAMINEÆ.

607 **Bambusa arundinacea,** RETZ. *Kan.* Bidiru, Ande bidarus, Bidungulu ?

Fig.—*Roxb. cor. Pl. i., t. 79.*

References.—*Fl. of Brit. Ind.*; *Pharm. Ind.*; *Dict. of Econ. Prod. of Ind.*

The prickly bamboo of India. Although but a giant grass, this is one of the most valuable products of the forest. The bamboos of Mysore, in common with those of other parts of the empire, die off after seeding; but, as a rule, the seed is self-productive and soon replaces the original clumps, it is also widely distributed by birds and animals. It is not unusual during periods of abnormal drought, for whole plantations to die out; and in such cases the seed may be prematurely formed and therefore incapable of reproducing growth. "The Malnad bamboos are noted for their size, but do not equal those that are known as *andé bidarus* in the Mysore forests." *Atlas of the Mysore State.* Several species of *Bambusa* are cultivated in the Botanical Gardens, but it is not known how many are indigenous to the province. The so-called 'male bamboo' is not uncommon in some parts, but as Dr. Watt has written. "The term 'male bamboo' may be said to be applied to any solid bamboo used for spear or lance staves, walking-sticks, &c; it is, however, says the same authority, "more particularly applicable to *Dendrocalamus strictus.*" The golden bamboo, (*Bambusa vulgaris*) cultivated in local gardens, is an exotic species of great beauty. The commercial value of several species of *Bambusa* is well known, and it is unnecessary to enumerate their various uses in a pocket manual like "The Forest Trees of Mysore and Coorg."

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APPENDICES.

LIST 1.

The vernacular names given in the annexed list were mostly found on specimens of timber presented to the Government Museum by the late Mr. E. P. Lovery, while he was Assistant Conservator of Forests in the Shimoga District. Unfortunately the scientific names of these specimens are not given, and hence the reason for publishing the vernacular names only. While some of the latter may apply to undescribed species, it is believed that the bulk of them are referable to one or other of the Malnad trees already enumerated in this edition. But that can only be verified on the receipt of botanical specimens gathered from the trees which bear these local names.

A.

Achal.
Ackerakalu.
Acheralu.
Adchari.
Ali.
Ambatti.
Andaburga.
Andamurka.
Anengi.
Angadhari.
Appemavu.
Aremadlu.
Aremensu.
Arnelli.
Arsingarige.
Asangi.
Asare.
Avali.

B.

Balari.
Balu.
Banagare.
Banagi.
Banchige.
Bannadamara.
Barangi.
Battbcgi.
Belalbukki.
Bellgothe.
Belwatte.
Bendebelal.
Bhoci.
Bidi salle.
Bilal.
Bilchi.
Biligari.
Biligola.
Bili hygal.
Bili mara.
Bilisalle.
Birkinbalige.
Bili tyaga.
Bore.
Bud belal.
Burada mara.

C.

Challanga.
Chendaka.
Chenduglu.
Chendraguppe.
Chitta bage.
Chungani.
Chungoli.
Churchi.
Churi.

D.

Dinda channangi.
Dind pachale.
Dodda topu mara.
Dodda yale mara.
Dod thoppe.
Dudda.

G.

Galada mara.
Gandachari.
Gandakuga.
Garike mara.
Genasu.
Ginchi.
Gobalagere.
Gohra nellu mara.
Gochi mara.
Gonigal.
Gorabale.
Gudde tumari.
Gujiga.
Gurgi.

H.

Hadsa.
Hael godcha.
Hagari.
Haggada mara.
Halboji.
Haliga.
Halmakki mara.
Halmuttuga.
Hanamakshi.
Hangara.
Hanigere.
Hannu sampe.
Haralu bandaga.
Harmashi.
Hassurmakki.
Hedagalu.
Heggare.
Hebige.
Hinari.
Hippali mara.
Holageri.
Hole bagi.
  baralu.
  honne.
  salle.
Honnalu.
Honnerlu.
Hothi.
Hotte nola.
Hubbalu.
Hujali.
Hulaga.
Huli chippu.
  honne.
Huli nellu.
  nerlu.
  nanja.
  todagina mara.
Hullu karte.
Hunagalu.
Hunasalu.
Hurakamma mara.
Hurangeru.
Huttambili.

I.

Iegola.
Isaparihara.

J.

Janga.
Javanige.
Jinagi.
Jiraka.
Jiruta.
Juma.

K.

Kabale.
Kabbanni.
Kadamate.
Kadu kallu mara.
Kadu kanchi mara.
Kaggundi.
Kallaragi.
Kallugatti.
Kalmitli.
Kan sampe.
Kan tumari.
Kari higgalu.
Karike.

Kari.
Karivra.
Kariwala.
Kattugodana mara.
Kembosi.
Kempunola.
Kenchala.
Kenda sampige.
Kilagurige.
Kinachinkana mara.
Kirga.
Kodi sampige.
Kodsa.
Kolsampige.
Kondamate.
Kondachellu.
Konda sampige.
Koraduvadakana mara.
Korle.
Kottiga.
Kowlu.
Kubare.
Kunale.
Kunnugal.
Kural.

L.

Lingadhari.

M.

Maddale.
Maddarasa.
Madhalasu.
Madli.
Malaga.
Male nerlu.
Manigonda.
Maragowri.
Marahale.
Marga.
Massibelalu.
Mukarti.
Mullugothi.
Murki.

N.

Naga mara.
Nai garige.
Nai halasu.
Nanja.
Nevala.
Nigori.
Niralada mara.
Nirubanni.
Niru vatte.
Nurkalu.
Nyamatti.

O.

Oodde.
Oonni.
Ovate.

P.

Padapachale.
Parengeru.
Patiga.
Penalu.
Pillangi.
Povsi.
Puttaganni.
Puttasamige.

R.

Rachada mara.
Ragtabhutale.
Runja.

S.

Sabbige.
Sakalati.
Sanna katti kayi mara.
Sannelli.
Shadlu.
Sharu.
Shikanchi.
Shilanga.
Sidharala.
Simarthadi.
Sivane.
Sotta mugali.
Sugati.
Sujagara.
Surati.

T.

Tanasi.
Tegatuppada mara.
Thoppalada mara.
Thuralu.
Togal.
Tomar.
Tumri.
Tupa devadaru.
Tuparu.

U.

Uyi karike.

V.

Vate.
Vate huli.
Vatevanadamara.
Vedarasi.

LIST 2.

The annexed short lists of trees, with other plants selected for special purposes, may be of use to readers of this book. Fuller details of the trees named, will, of course, be found in the body of the work.

Evergreen Trees.

A.—*Exotic trees suitable for shade or effect in Gardens, Parks, and ornamental grounds.*

Scientific name.	Habit of growth.
Araucaria Cookii	Symmetrical and conical.
Bidwillii	Do
Cunninghamii	Do
,, var. glauca	Do
excelsa	Do
Dammara robusta	Do
australis	Do
Cupressus sempervirens	Erect, compact, columnar and funereal.
torulosa	Conical.
Anda Gomesii	Round-headed and moderately spreading.
Castanospermum australe	Do
Eucalyptus rostrata	Australian gum trees.
citriodora	
Ficus Benjamina	Robust and wide-spreading.
var. comosa	Do
Roxburghii	Do
macrophylla	Do
Cunninghamii	Do
elastica	Do
Artocarpus Cannoni	Do
Grevillea robusta	Conical, with silvery-foliage.
Kigelia pinnata	Round-headed and very dense.
Nephelium litchi	Do
loganum	Do
Pithecolobium saman	Robust and wide-spreading.
Schinus molle	Weeping.
Swietenia Mahagoni	Round-headed.
macrophylla	Do
Cæsalpinia coriaria	Umbrella-shaped.
Cassia siamea	Moderately round or ovoid.
marginata	Round-headed.
Parkia biglandulosa	Round-headed at the summit of a tall trunk.
Colvillea racemosa	Moderately round and spreading.
Brassaia actinophylla	Umbrella-shaped.
Lagunaria Patersoni	Conical.

B—*Indigenous trees suitable for avenues and roadside planting throughout the maidan.*

Michelia champaca	...	...	Best in the Malnad.
Polyalthia longifolia	...	...	Slow of growth.
Pterospermum Heyneanum	...	...	
Ochrocarpus longifolius	...	...	Best towards the hills.
Calophyllum inophyllum	...	...	Do
Thespesia populnea	...	...	
Citrus decumana	...	...	
Bursera serrata	...	...	Slow of growth.
Filicium decipiens	...	...	
Melia Azadirachta	...	...	
Azedarach	...	...	
Gelonium lanceolatum	...	...	Best towards the hills.
Amoora Rohituka	...	...	
Chickrassia tabularis	...	...	
Ficus retusa	...	...	
Tsiela	...	...	
Mangifera indica	...	...	
Dalbergia sissoo	...	...	
Mimusops elengi	...	...	Best in the Malnad.
Diospyros embryopteris	...	...	Do
Tamarindus indica	...	...	
Saraca indica	...	...	
Engenia Jambolana	...	...	
Artocarpus integrifolia	...	...	

C—*Indigenous trees suitable for avenues in the Malnad districts.*

Antiaris toxicaria	...	...	Upas, or sack tree.
Dillenia bracteata	...	...	
Garcinia xanthochymus	...	...	Conical in habit.
Hopea parviflora	...	...	
Wightiana	...	...	
Anthocephalus cordatus	...	...	
Myristica laurifolia	...	...	
magnifica	...	...	
Mesua ferrea	...	...	
Hydnocarpus alpina	...	...	
Vateria indica	...	...	
Melia dubia	...	...	
Michelia champaca	...	...	
Mimusops elengi	...	...	
Calophyllum tomentosum	...	...	
Ficus Trimeni	...	...	
Artocarpus hirsuta	...	...	Wild jack.

LIST 3.

Trees that are deciduous or subdeciduous for a short period, but still good avenue trees.

Ficus religiosa.
  mysorensis.
  Bengalensis.
  tomentosa.
  infectoria.
Acacia leucophlæa.
  suma.
  ferruginea.
  catechu.
Acacia arabica.
Acrocarpus fraxinifolius.
Albizzia stipulata.
  odoratissima.
Sterculia fœtida.
  guttata.
Spathodea campanulata.
Pterocarpus marsupium.
Protium caudatum.
Pongamia glabra.
Millingtonia hortensis.
Gmelina arborea.
Stereospermum suaveolens.
Salix tetrasperma.
Terminalia Catappa.

LIST 4

Trees with handsome flowers.

Scientific name.	Colour of flower.
Bombax malabaricum	Red.
Eriodendron anfractuosum	White.
Cochlospermum gossypium	Yellow.
Erythrina indica	Crimson.
vár alba	White.
stricta	Scarlet.
caffra	Red.
ovalifolia	Reddish.
Butea frondosa	Orange and red.
Cassia fistula	Yellow.
marginata	Dull red.
siamea	Yellow.
Millingtonia hortensis	White.
Bauhinia monandra	Variegated.
variegata	Do
purpurea	Purple.
Hookerii	Whitish-rose, stamens red.
candida	White.
Saraca indica	Orange-red.
Castanospermum australe	Orange-red.
Poinciana Regia	Variegated.
Spathodea campanulata	Orange-red.
Lagerstroemia Flos-Reginæ	Purple.
Colvillea racemosa	Orange-red.
Michelia champaca	Yellow.
Eugenia Jambos	Cream.

Scientific name.	Colour of flower.
Sterculia colorata	Red.
Cæsalpinia sappan	Yellow.
Stereospermum suaveolens	Rosy-purple.
Mangnolia grandiflora	White.
Brownea rosea	Rose.
Cæsalpinia pulcherrima	Red-yellow.
Tecoma stans	Yellow.
Poinciana elata	Pale yellow.
Grevillea robusta	Red-yellow.
Ixora parviflora	White.
Pterocarpus marsupium	Golden yellow.
Stereospermum xylocarpa	White.
Parkia biglandulosa	White.
Citrus decumana	White.
Plumeria acuminata	Creamy-white.
Thespesia populnea	Yellow.
Moringa pterygosperma	Creamy-white.

LIST 5.

Reserved trees.

No.	Commercial or vernacular names.	Scieutific name.
1	Sandal	Santalum album.
2	Teak	Tectona grandis.
3	Biti	Dalbergia latifolia.
4	Honne	Pterocarpus Marsupium.
5	Nandi	Lagerstroemia lanceolata.
6	Heb halasu	Artocarpus hirsuta.
7	Jalari	Shorea talura.
8	Kuve (Bobbi)	Calophyllum tomentosum.
9	Karachi (Kammar)... ...	Hardwickia binata.
10	Kari matti	Terminalia tomentosa.
11	Bili matti	Terminalia arjuna.

LIST 6.

Trees fit for sleepers and other Railway purposes.

No.	Commercial or vernacular name.	Scientific name.
1	Teak	Tectona grandis.
2	Honne	Pterocarpus Marsupium.
3	Biti	Dalbergia latifolia.
4	Nandi	Lagerstroemia lanceolata.
5	Heb halasu	Artocarpus hirsuta.
6	Kari matti	Terminalia tomentosa.
7	Hoonal (Hulve)	Terminalia paniculata.
8	Jambe	Xylia dolabriformis.
9	Bilwara	Albizzia odoratissima.
10	Tadasalu	Grewia tiliæfolia.
11	Bage	Albizzia Lebbek.
12	Bogi	Hopea parviflora.
13	Ippe	Bassia latifolia.
14	Massi	Sterculia villosa.
15	Hadaga	Cornus macrophylla.
16	Dindiga	Anogeissus latifolia.

LIST 7.

Plants affording Oils.

Scientific Name.	English Name.	Kanarese Name.
Achyranthes aspera ...		Uttarani gida.
Aleurites moluccana ...	Belgaum Walnut tree...	
Arachis hypogea ...	Ground nut ...	Kadale kai gida.
Argemone mexicana ...	Yellow thistle or mexican poppy ...	Datturi gida.
Bassia longifolia ...	Mahwa or sapota ...	Ippe mara.
Brassica nigra ...	Common mustard ...	Kari sasive gida
,, alba ...	White ,, ...	Bili ,,
Canarium commune ...	Java almond tree ...	Java badami mara.
Carthamus tinctorius ...	Safflower ...	Kusamba gida.
Cassia auriculata ...	Tanner's Cassia ...	Olle tangadi gida.
Celastrus paniculata ...		Kangondi balli.
Cinnamonum zeylanicum ...	Cinnamon tree ...	Dalchinni mara.
Cocos nucifera ...	Cocoanut tree ...	Tengina mara.
Croton Tiglium ...	Croton oil plant ...	Japala gida.
Cymbopogon pachnodes ...	Kachi grass ...	Kachi hullu.
Erythroxylon monogynum...	Bastard sandal ...	Devadári gida.
Garcinia Morella ...	The Indian gamboge...	Aradala mara, Kankutake mara.
Guizotia abyssynica ...	Foolish oil plant ...	Hutchellu gida.

LIST 7.—*Continued.*

Scientific Name.	English Name.	Kanarese Name.
Hibiscus sabdariffa ...	The Rozelle ...	Kempu pundrike gida.
Hymenodictyon excelsum ...		Bandare gida.
Helianthus annus ...	Sunflower ...	Suryakanti gida.
Jatropha curcas ...	Physic or purging nut..	Turuka haralu gida; Kadu haralu gida.
Linum usitatissimum ...	Flax; Linseed plant ...	Agase gida.
Melia Azadirachta ...	Neem tree ...	Bevina mara.
Michelia champaca ...		Sampage mara.
Nicotiana Tabacum ...	Tobacco ...	Hoge soppu gida.
Papaver somniferum ...	Opium poppy ...	Gasagasi gida.
Pongamia glabra ...	Indian beech ...	Honge mara.
Pterocarpus marsupium ...	Kino tree	Honne mara.
Raphanus sativus ...	White Radish ...	Bile mallangi.
Ricinus communis ...	Castor oil plant ...	Haralu gida.
,, ,, var. ...	,, (small seeds) ...	Chitta haralu gida.
Santalum album ...	Sandalwood tree ...	Gandhada mara.
Sesamum indicum ...	Gingelie oil plant ...	Olle yellu gida. Atchellu gida.
Terminalia Catappa ...	Country almond tree...	Badami mara.

LIST 8.

Plants affording useful Fibre.

Scientific Name.	English Name.	Kanarese Name.
Agave americana ...	American aloe ...	Kattali.
,, ,, variegata ...	Variegated ,, ...	Bannada kattali.
Fourcroya gigantea ...	Giant ,, ...	Masaru ,,
Sanseveira zeylanica ...	Bow-string hemp ...	
Yucca gloriosa ...	Adam's Needle ...	
glaucescens ...		
Doryanthes Palmerii ...		
Musa paradisiaca ...	Plantain or Banana ...	Bale gida.
textilis ...	Manilla hemp ...	
Grewia oppostifolia ...		Butale mara.
columnaris ...		
Hibiscus rosa-sinensis ...	Shoe flower ...	Dasalada gida.
cannabinus ..	Hibiscus Hemp ...	Holada pundrike gida; pundi gida.
esculentus ...	Okra ...	Bende gida.
elatus ...	Cuba bast ...	
tricuspis ...		
Pandanus furcatus ...	Screw pine ...	Tal gida ?
Do variegata ...	Variegated pine ...	Do
Cyperus Pangorei ...	Indigenous sedge ...	....
Ananasa sativa ...	The pine apple ...	Ananas gida.
Cocos nucifera ...	Cocoa-nut	Tengina mara.
Crotalaria juncea ...	Sunn fibre... ...	Sanabu gida.

LIST 8.—(*Continued.*)

Scientific Name.	English Name.	Kanarese Name.
Cannibis sativa ...	Hemp ...	Bangi gida.
Ficus Benjamina ...	Java fig tree ...	
Bengalensis ...	Banyan ...	Alada mara.
Triumfetta angulata ...		
Bœhmeria nivea ...	Rhea Fibre or grass-cloth plant ...	Kittanaru gida.
Typha elephantina ...	Elephant grass ...	Jambu hullu.
Abutilon striatum var. Thomsonii ...	Thomson's Abutilon ...	
Gauzuma tomentosa ...	Bastard cedar ...	Rudrakhi mara.
Cordia Myxa ...	Sebesten plum ...	Solle mara; kendal mara:
Urena sinuata ...	Silky fibre ...	
lobata ...	Do ...	
Corchorus olitorius, var. ...		
Malachra capitata ...		
Careya arborea ...		Gouju mara.
Helicteres Isora ...	Indian screw tree ...	Yedamuri gida.
Butea frondosa ...	Pulas kino tree ...	Muttuga mara.
Bauhinia Vahlii ...	Gigantic Camel's foot ..	
racemosa ...		Achalu mara.
Caryota urens ...	Malabar sago palm ...	Bagani mara.
Arenga saccharifera ...		
Hardwickia binata ...		Karachi mara.
Melia Azadirachta ...	The Neem tree ...	Bevina mara.
Calotropis gigantea ...	Mudar ...	Yekkada gida.
Andropogon muricatus ...	Kus-kus grass ...	Gandu ganjala garike hullu.
Antiaris toxicaria ...	Sack tree	

LIST 9.

Plants affording Gums and Resins.

Scientific Name.	English Name.	Kanarese Name.
Acacia arabica ...	Indian gum-arabic. Babool. ...	Kari jali mara.
catechu ...	The Cutch tree. brown-barked-Acacia ...	Kaggali mara.
Farnesiana ...	"Cassie" Fragrant Acacia ...	Kasturi jali gida.
leucophlæa ...	Panicled Acacia ...	Bili jali mara.
suma ...	White-barked Acacia ...	Mugali mara.
Achras sapota ...	The Sapodillà-Plum tree	
Ægle marmelos ...	The Bael tree ...	Bilvapatre mara.
Agati grandiflora. syn-Sesbania grandiflora ...		Agase mara.
Albizzia amara ...		Sujjalu mara.
Lebbek ...	The Siris or Sirissa tree ...	Bage mara.
stipulata ...		Hotte bage mara.
Aloe vera ...	Indian aloe ...	Kattah.
Anacardium occidentale ...	Cashew-nut tree ...	Jidi mara.

LIST 9.—(*Concluded.*)

Scientific Name.	English Name.	Kanarese Name.
Anogeissus latifolia ...		Dindiga mara.
Araucaria Cookii ...	The Caledonian pine ...	
Areca Catechu ...	Betel-nut palm ...	Adike mara.
Artocarpus incisa ...	Bread-fruit tree ...	Divi alasu mara.
integrifolia ...	Jack-fruit tree ...	Halasina mara.
Astragalus verus ...		
Balsamodendron Myrrha ...	The Myrrh tree ...	
Bassia longifolia ...	The Mahwa tree ...	Ippe mara.
Bauhinia purpurea ...		Kanchivalada mara; Kempu mandare mara.
variegata ..		Do
Bombax malabaricum ...	The silk cotton tree ...	Kempu burugada mara.
Borassus flabelliformis ...	The palmyra tree ...	Tale mara.
Boswellia floribunda ...	The Frankincense tree.	Parangi sambrani mara.
Buchanania latifolia ...	The cheroonjie tree ...	Murkali mara; morave mara.
Butea frondosa ...	Pulas kino tree, or Dhak tree ...	Muttuga mara.
Casuarina equisetifolia ...	The Tinian pine. Beef-wood Tree ...	Kesarike mara.
Calotropis gigantea ...	Mudar ...	Yekkada gida.
Canarium strictum ...	Black dammar tree ...	
Cassia auriculata ...	Tanners Cassia ...	Olle tangandi gidâ.
fistula ...	The Indian laburnum...	Kakke mara.
florida ...		
Cedrela Toona ..	White Cedar ...	Gandhagarige mara.
Cæsalpinia coriaria ...	American Sumach. Divi Divi ...	
Cinnamomum camphora ...	Camphor ...	Karpura.
Citrus decumana ...	The Pumelo ...	Chakotri gida.
medica ...	The Citron ...	Madavala gida.
Cochlospermum gossypium.	Golden silk cotton tree.	Arisina buruga mara.
Chloroxylon swietenia ...	Satin-wood tree ...	Huragalu mara.
Cryptostegia grandiflora ...	New zealand Pine ...	
Dammara robusta ...		
Eriodendron anfractuosum..	White silk cotton tree...	Bili buruga mara.
Euphorbia antiquorum ..		Bonte kalli.
Tirucalli ...	Milk hedge ...	Mondu kalli.
Eucalyptus marginata ...	The Jarrah ...	
rostrata ...		
Feronia Elephantum ...	Elephant or wood apple.	Belada mara.
Ficus elastica ...	The Indian rubber tree.	
Bengalensis ...	The Banyan tree ...	Alada mara.
religiosa ...	The sacred peepul tree.	Arali mara, Ragi mara; Aswatha mara.
Garcinia Morella ...	Gamboge ...	Aradalada mara; Kankutygal mara.
Garuga pinnata ...		
Grevillea robusta ...	The Silver Oak tree ...	
Guaiacum officinale ...	Guaiac tree ...	
IsonandraGutta syn. Dichopsis Gutta ...	Gutta-percha ...	

LIST 9.—(*Concluded*)

Scientific Name.	English Name.	Kanarese Name.
Jatropha curcas ...	Physic or Purging nut plant ...	Turuka haralu gida; Kadu haralu gida; Dodda haralu gida.
Mangifera indica ...	Mango tree ...	Mavina mara.
Manihot Glaziovii ...	The Ceara rubber ...	
Melia Azadirachta ...	The Neem or Margosa tree ...	Olle bevina mara
Azadarach ...	The Persian Lilac. The Bead tree ...	Hutchu Do
Moringa pterygosperma ...	The drum-stick, or horse radish tree ...	Nugge mara.
Morus nigra ...	Black mulberry ...	Uppanerale mara.
Pithecolobium saman ...	The rain tree ...	
Poinciana elata ...		Sunkatti mara.
Poinsettia pulcherrima ...		
Prunus communis ...	The plum tree ...	
Persica ...	The peach tree ...	Pichis mara
Pterocarpus Marsupium ...	The Indian kino tree ...	Honne mara.
Shorea talura ...	The lac tree ...	Jalari mara.
Spondias mangifera ...	The hog plum ...	Amate mara.
Stryax Benzoin ...	The Benzoin tree ...	
Liquida ...		
Strychnos potatorum ..		Chillu mara
Swietenia Mahagoni ...	Mahogany tree ...	
Terminalia Catappa ...	Country almond tree ...	Valagra Badami mara.
Vateria indica ...	Indian copal tree ...	Dhupada mara
Wrightia tinctoria ...	Ivory wood ...	Beppale mara.

LIST 10.

Plants affording Dyes and Colours.

Scientific Name.	English Name.	Kanarese Name.
Soymida febrifuga ...	Bastard red cedar ...	Swami mara.
Erythroxylon monogynum ..	Bastard sandal ...	Devadari mara:
Toddalia aculeata ...	Prickly Toddalia ...	Kadu menasu gida.
Bixa Orellana ...	Annatto ...	Rangumale gida.
Curcuma longa ...	Turmeric ...	Arisina gida.
Cæsalpinia sappan ...	Sappan wood tree ...	Patauga mara.
Butea frondosa ...	Pulas kino tree ...	Muttuga mara.
Hibiscus rosa-sinensis ...	Shoe-flower	Dasalada gida.
Semecarpus Anacardium ...	Marking-nut tree ...	Geru mara.
Terminalia chebula ...	Myrobalan ...	Aralekayi mara.
Morinda citrifolia ...	Indian mulberry ...	Maddi mara.
Shorea talura ...	The Lac tree ...	Jalari mara.
Hæmatoxylon campechianum ...	Logwood ...	
Coscinium fenestratum ...	Tree Turmeric ...	Marada arisina.

LIST 10.—(*Concluded*)

Scientific Name.	English Name.	Kanarese Name.
Ventilago madraspatana ...		Popli gida.
Lichen rotundatus ...	Rock Moss ...	Kallu pachi.
Mallotus philippinensis ...	Kamala Dye ...	Kapilarangumara. Kunkumada mara.
Wrightia tinctoria ...	Ivory Wood ...	Beppale mara.
Garcinia Morella ...	Gamboge ...	Aradalada mara, Kankutuge mara.
Tephrosia tinctoria ...	Ceylon Indigo ...	Ceylaw gida, Batte harikina gida.
Pterocarpus santalinus ...	Red Sandalwood ...	Rakta chandanada mara.
Buchanania latifolia ...		Murkali mara.
Cassia Fistula ...	The Indian Laburnum.	Kakke mara.
,, Tora ...	Foetid Cassia ...	Gundu tagaci gida.
,, auriculata ...	Tanner's Cassia ...	Olle tangadi gida.
Carthamus tinctorius ...	Safflower ...	Kusumba gida.
Casuarina muricata ...	The Tinian Pine. Beef-wood Tree ...	Kesarike mara.
Rubia cordifolia ...	Indian Madder, or Munjeet ...	
Acacia arabica ...	Babool ...	Kari jali mara, gobli mara.
,, leucophlæa ...	Panicled Acacia ...	Bili jali mara.
Areca catechu ...	Betel-nut palm ...	Adike mara.

LIST 11.

Plants affording materials for Bleaching, Tanning and Currying.

Scientific Name.	English Name.	Kanarese Name.
Acacia leucophlæa ...	Panicled Acacia ...	Bili jali mara.
,, arabica ...	Babool ..	Kari jali mara; gobli mara.
,, catechu ...	Brown-barked Acacia...	Mugali mara.
Butea frondosa ...	Pulas Kino tree ...	Muttuga mara.
Bauhinia variegata ...	Mountain Ebony ...	Bili kanchivalada mara.
Calotropis gigantea ...	The Mudar ...	Yekkada gida.
Pterocarpus Marsupium ...	Kino tree ..	Honne mara.
Terminalia chebula ...	Myrobalan ...	Aralekayi mara.
,, belerica ...	Beleric Myrobalan ...	Tare mara.
Casuarina equisetifolia ...	The Tinian Pine. Beef-wood tree ...	Kesarike mara.
Hibiscus rosa-sinensis ...	Shoe-flower ...	Dasalada gida.
Zizyphus Jujuba ...	The Bhere fruit tree.	Yelachi mara.
Nycthanthes arbor-tristis ...	Night flowering jesamine ...	Parijata gida.
Buchanania latifolia ...		Murkali mara
Cæsalpinia coriaria ...	American Sumach. Divi Divi ..	
Cassia auriculata ...	Tanner's Cassia ...	Olle tangadi gida.
Punica granatum ...	The Pomegranate ..	Dalimbare gida.
Careya arborea ...	Carey's tree ...	Gouju mara.

LIST 12.

Agricultural Products.

Scientific Name.	English Name.	Kanarese uame.
Eleusine coracana ...		Majjige ragi.
,, ...		Kari ,,
,, ..		Kempu ,,
,, ...		Chennamudda ragi.
,, ...		Ginimuti ragi.
,, ...		Hullu bili ,,
,, ...		Sove ,,
,, ...		Kuruba ,,
,, ...		Bili ,,
Dactyloctenium ægyptiacum	Buffalo-head grass ...	Kadu ragi; Konana tale hullu.
Panicum italicum ...	Indian millet ...	Bili navane.
,, ...	,, ...	Jade ,,
,, ...	,, ...	Kempu ,,
,, ...	,, ...	Navane.
,, ...	,, ...	Kari ,,
,, ...	,, ..	Mabbu ,,
,, ...	,, ...	Korle ,,
,, ...	,, ...	Kari ,,
Panicum frumentaceum...		Bili same.
,, ...		Kari ,,
,, ...		Mabbu,,
,, miliaceum ...	Little millet ...	Bili baragu.
,, do ...	,, ...	Kari ,,
,, semiverticellatum...		Haraka.
Penicillaria spicata ...	Spiked millet ...	Sajje.
Sorghum vulgare ...	Great do ...	Bili jola.
Zea Mays	Maize, or Indian corn..	Jola.
Triticum vulgare ...	Wheat ...	Godhi.
,, ...	,, ...	Jave godhi.
,, ...	,, ...	Hotte ,,
Bambusa arundinacea ...	Common prickly bamboo	Bidaru.
Arachis hypogea ...	Ground nut ...	Kadalekayi.
Cajanus indicus ...	Pigeon pea, or dholl ...	Togari.
Cicer arietinum ...	Bengal gram ...	Kempu kadale.
,, ...	,, ...	Kari ,,
Dolichos catiang ...	Small fruited Dolichos.	Tatada gani.
,, biflorus ...	Horse gram ...	Hurali.
,, lablab ...	Cow gram ...	Avare.
Ervum lens ...	The lentil ...	Massur.
Phaseolus mungo ...	Green gram ...	Hesaru.
,, do var-glaber.	Black gram ...	Vuddu.
Coriandrum sativum ...	Coriander ...	Kottumbari.
Brassica nigra ...	Common mustard ...	Kari sasive.
,, alba ...	White do ...	Bili ,,
Trigonella fœnum-græcum	Feuugreek ...	Mentya.
Piper nigrum ...	Black pepper ...	Menasu.
,, alba ...	White do ...	Bili menasu.
Cuminum Cyminum ...	The cummin-seed ...	Jirige.
Pimpinella anisum ...	Anise seed ..	Dodda jirige.
Carum copticum ...	Bishop's weed ..	Omu.
Papaver somniferum ...	Opium poppy ...	Gasagase.
Sesamum indicum ...	Gingelie oil plant ...	Hutchellu.
Carthamus tinctorius ...	Safflower ...	Kusumba gida.
Linum usitatissimum ...	Linseed; flax ...	Agase bija.
Hibiscus sabdariffa ...	The rozelle ..	Kempu pundrike gida.
Oryza sativa ...	Paddy ...	Nellu; batha.

Statement showing the ***area of reserved and unreserved forest*** *in each* ***District*** *of* ***Mysore.***

No.	District.	Forest area, in square miles.		Chief sources of forest revenue.
		Actually reserved.	Approximately unreserved.	
1	Shimoga.	317	549	Sandalwood, timber and bamboos.
2	Bangalore.	312	131	Sandalwood, bamboos, forest produce-bearing trees, and fuel; the latter covering an area of about 2,000 acres.
3	Mysore.	279	207	Timber, sandalwood, bamboos and minor forest produce.
4	Kolar.	219	110	Bamboos, fuel, forest produce-bearing trees, and sandalwood.
5	Hassan.	172	250	Sandalwood, firewood, and minor products.
6	Tumkur	140	61	Minor forest products.
7	Kadur.	88	193	Sandalwood, timber, and bamboos.
8	Chitaldroog.	84	49	Minor forest products, particularly tangadi bark.

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